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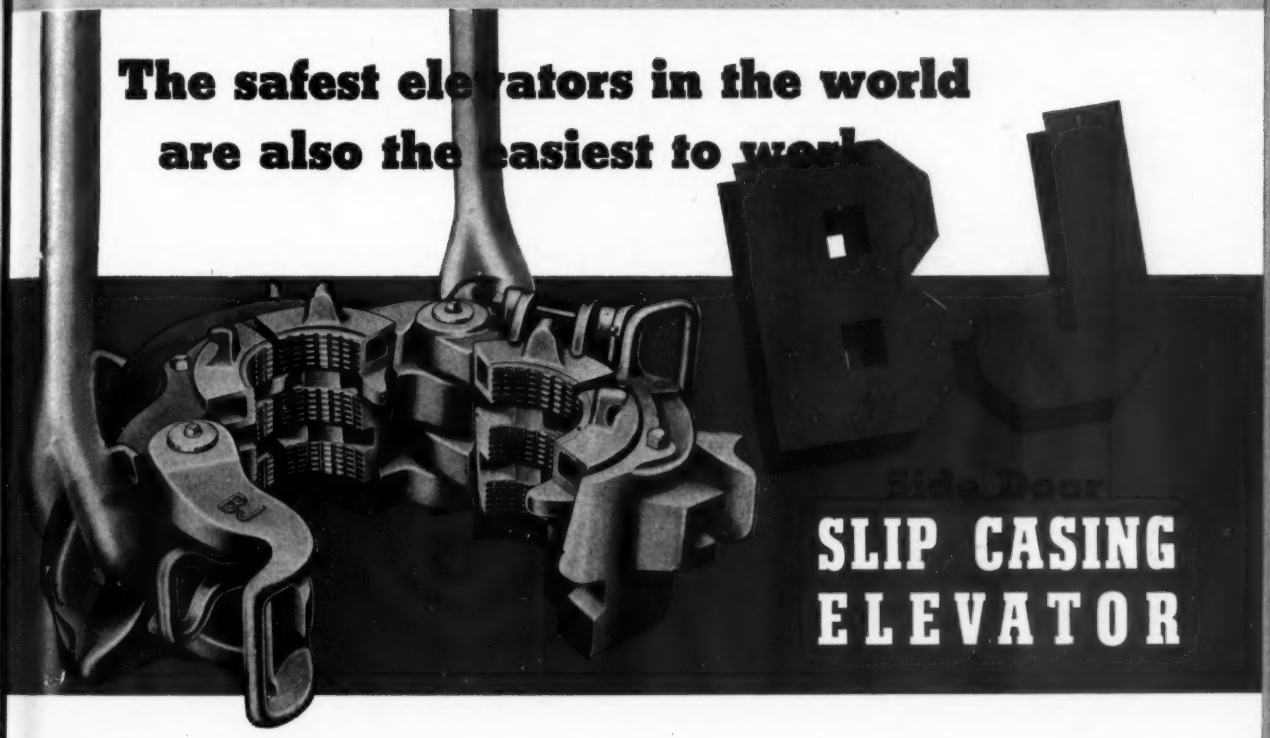

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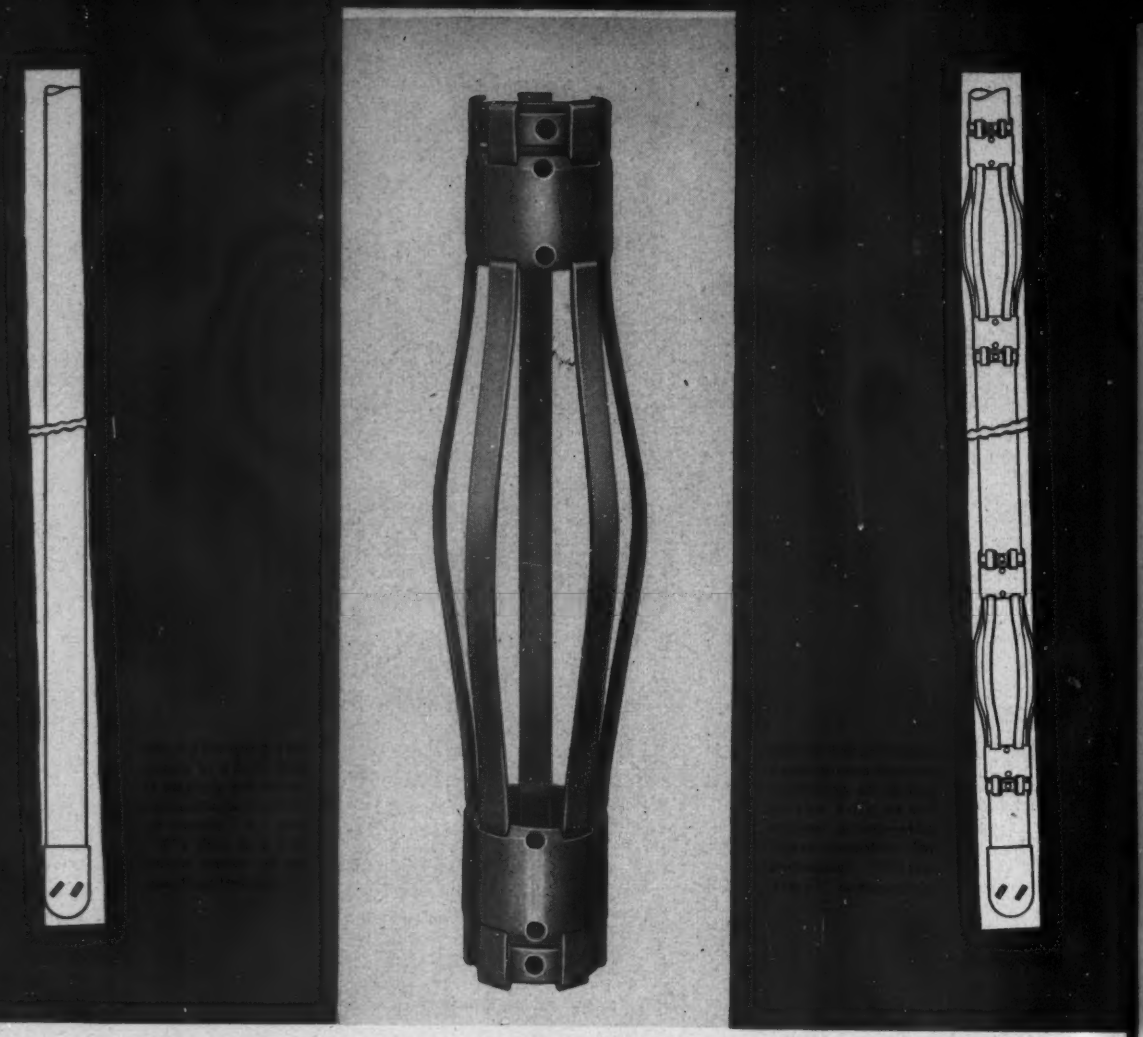

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Unitization

NATIONAL and international competitive conditions and new techniques are giving added impetus to the trend toward greater unitization in petroleum operations, applying both to the development of new fields and to the application of secondary recovery.

The soundness of unitized development has been demonstrated in several fields under widely varying conditions, so that most operators now accept it as the most efficient method of producing crude oil. Its utilization has greatly increased the quantities of recoverable oil.

It is recognized that unitization is the only practical solution to many problems having to do with the application of regulations administered by the state conservation bodies. New legislation and court decisions are steadily strengthening the legal position of this type of oil operations.

Unfortunately there are still reports of delays in the carrying out of unitized programs because of the antagonistic attitude of royalty interests. This usually reflects a lack of understanding of the practices involved by those whose only connection with the oil business is confined to returns on royalties. These interests oftentimes are distributed among hundreds or thousands of investors covering the operations of one field.

Instead of opposition, royalty owners should give their unqualified support to unitization plans. Experience has proved that as a group they derive the greatest benefits.

The petroleum engineer and geologist have largely eliminated any guesswork as to yields to be expected when properties are combined in a single operation. The results invariably have exceeded expectations at the time the programs were formulated.

Competent observers have said that royalty owners have more at stake than immediate returns on their investments. Proponents of federal control of the oil business are wont to point to what they consider a basic weakness in this country's oil economy in that the mineral rights are not owned by the Government as they are throughout most of the world.

Failure to give full support to operating programs designed to assure maximum recoveries of oil with a minimum of waste obviously plays into the hands of those who favor doing whatever is deemed expedient in mineral ownership to center oil controls at Washington.

Royalty participation in the petroleum operations of this country, over-all, has served a constructive end. Certainly it is basic in the application of free enterprise to the oil industry. But there must be recognition of the fact that in the application of conservation practices and the maintenance of sound relations with state and federal governments the principal duties rest with those who have the many responsibilities of operation.

House Votes Extension of Tanker Operation Until June 30

WASHINGTON.—Authority for the Maritime Commission to continue to operate tankers and other vessels until June 30, 1947, is contained in a resolution passed by the House this week and sent to the Senate. Present authority expires February 28.

Hearings on the measure before the House merchant-marine committee last week, scheduled as a brief formality, developed into a heated discussion over tankers. Because of a general desire to put through this legislation before the end of the month, the discussion was cut short, but committee members indicated they will go further into the tanker situation at a later hearing and they warned the commission that it must get out of the tanker-operating business by June.

Adm. W. W. Smith, chairman of the Maritime Commission, explained to the committee that it had been expected that the Government would stop its wartime shipping operations by this time but that continuance is necessary for six types of operations —tankers, emergency coal and grain-export programs, cargoes for military services, repatriation and displaced-persons program, coastwise and intercoastal trades, and Alaskan service. As compared with 5,366 vessels the commission was operating on VJ-Day, he said the operating fleet is now down to 828 ships, including 269 tankers, though many of these are currently laid up for repairs.

"Most of the abnormal tanker demand must be met by American flag tonnage which far exceeds all others because of our wartime construction and war losses by other nations," Smith said. "U. S. flag tanker operators do not, however, have sufficient tanker tonnage to meet the demand. This places the burden on the government-owned fleet, of which there are 568 vessels. Of these, 269 are in operation, repairing, or in process of disposal. The remainder have been placed in the reserve fleet."

This aroused the committee because of a provision in the Ship Sales Act prohibiting chartering tankers, though dry-cargo ships may be chartered. The commission was accused of violating the intent of Congress.

Commission officials, including C. H. McQuire, assistant director of traffic, and Roy E. Anderson, Socony-Vacuum Oil Co., Inc., official on loan as tanker consultant, attempted to explain that the legal prohibition is against "bareboat" chartering rather than "voyage" chartering. A bareboat charter is a long-term lease on a vessel under which the lessee furnishes his own crew, does his own maintenance, and has complete control of the vessel's operation. Under a voyage charter the hirer simply has one cargo hauled for him on contract, and the operator retains full responsibility for the ship.

The tankers operated by the Maritime Commission are under general-agency agreements (GAA) whereby various shipping companies actually man and run the ships but the commission directs them. Oil companies and others may have cargoes hauled for them, paying the commission a set freight rate. It is this GAA authority which expires February 28 under present law, and the commission witnesses declared it must be continued to prevent disruption of the world's oil trade.

Continued Tanker Need Seen

Several committee members took violent exception to this, declaring that it is a subterfuge to aid the oil industry. They insisted that the prohibition against chartering tankers was written into the law to force oil companies to buy surplus tankers outright instead of obtaining their use on charter. They demanded that it stop by this summer, though Admiral Smith said he thought there would be a big need for the operation for a good many months, and pointed out that there might not be enough tankers for sale to meet all demands since the joint chiefs of staff want the commission to keep a reserve fleet of tankers larger than the total number of tankers built during the war.

To answer the argument that the oil industry is benefiting by the GAA plan it was mentioned that the Government gets a very high rate for oil carried. For example, the rate on gasoline from Texas Gulf ports to New York is 8 or 10 cents per barrel above what private tankers would charge.

However, the committee was very critical of this high rate, charging that the Government is keeping the price of oil high and forcing consumers to pay for its shipping pool. It was brought out that tankers are among the most profitable ships being operated by the Government, and the returns are so high that the cost of a tanker can be amortized in 3 or 4 years. It was also explained that one purpose of the high charter rate is to induce oil companies to purchase their own tankers from the commission's reserve fleet.

Rep. Fred Bradley of Michigan, committee chairman, announced that oil companies are mistaken if they are delaying tanker purchases in the expectation that Congress will revise the Ship Sales Act to permit tankers to be sold at less than the present price of 87½ per cent of wartime cost to the Government. He also told Admiral Smith that if it appears that the GAA plan will be needed after June 30 to come back to Congress in plenty of time to let the committee make a thorough study, and he intimated that the committee will not be inclined to permit the tanker operation to continue beyond that date.

Texas March Allowable Raised 104,978 Bbl. Daily

HOUSTON.—The Texas Railroad Commission Tuesday set March crude-oil allowable for the nation's major producing state at 2,306,123 bbl. daily, an increase of 104,978 bbl. daily over the allowable as of February 15.

Less estimated underproduction of 6.75 per cent, the March allowable will yield a daily average production of approximately 2,150,000 bbl. daily.

The March allowable was announced following a morning market demand hearing with producers and purchasers. The Bureau of Mines estimate of demand for Texas crude in March was 2,060,000 bbl. daily.

According to E. O. Thompson, commission chairman, West Texas will be allowed 18 operating days and a daily allowable of 505,090 bbl.; East Texas, 21 days and 319,211 bbl. daily, and the remainder of the state, 27 days and 1,481,822 bbl. daily.

The original February allowable in Texas was 2,190,348 bbl. daily, an increase of 116,842 bbl. over that set for January. This original allowable was calculated to result in a daily February production of 2,042,500 bbl. daily, considering normal underproduction.

In setting the March allowable, members of the commission apparently took cognizance of the extremely tight crude market and the possibility of increased use of crude from foreign sources.

Plan Approved to Block Off Submerged Lands

AUSTIN.—Gov. Beauford H. Jester, Land Commissioner Bascom Giles and Attorney General Price Daniel have approved a program to block off the submerged land immediately off the Texas coast into 640-acre tracts. Farther seaward the state plans to block off the land in 6,760-acre tracts.

WAA Announces Sale of Big Inch To Texas Eastern Transmission

WASHINGTON.—War Assets Administration has agreed to sell the Government's two Big Inch pipeline systems in toto to Texas Eastern Transmission Corp. for $143,127,000 cash, to be used for transmission of natural gas to the Atlantic seaboard, subject to approval of the attorney general.

The sale was announced by Administrator Robert M. Littlejohn on February 14 only 4 days after the bids were received. Texas Eastern, a new corporation formed by E. Holley Poe who is well known in the gas industry, was by far the highest bidder, and its bid met all requirements laid down in the conditions of sale. Approval by the Department of Justice is required by the Surplus Property Act for all properties of more than $5,000,000, the purpose being to prevent sales which would foster monopoly. Under the circumstances, this approval should be routine, and is expected within a week or 10 days.

The successful bidder has already deposited $100,000 cash. It will pay $1,000,000 in cash within 5 days of receipt of a letter of intent to sell; $4,000,000 cash on receipt of a letter of entry authorizing possession under an interim lease; and the balance, $138,027,000, in cash within 9 months. In addition, the company will spend approximately $38,905,000 during the next 12 to 18 months on compressor stations and other construction and equipment necessary to convert the system to gas, bringing its liabilities to $182,032,000. The New York investment banking firm of Dillon, Read & Co., Inc., has agreed to underwrite this financing and will sell securities to private investors and the general public.

Gas Supply Promised

Arangements have already been made with United Gas Pipe Line Co. whose system crosses the Big Inch and Little Big Inch rights-of-way at several points, to act as the principal supplier of natural gas from Texas and Louisiana, and other connections will be made with fields within economical reach. The company promises to dedicate 25 per cent of its capacity to flare gas if this can be obtained. R. H. Hargrove, vice president of United Gas Pipe Line Co. and a stockholder in Texas Eastern, will take a leave of absence to assist the new company in its organization.

The company says the lines are physically capable, together with economically feasible extensions, of supplying the Appalachhian area, the Baltimore-Philadelphia-New Jersey area, the metropolitan New York area east of the Hudson River, and the New England area, and that any one of these areas could use the entire capacity of the lines. However, it proposes to spread its distribution as widely as possible in its service area.

The bid states the intention to give preference to manufactured-gas companies, largely by replacing oil used for enrichment and reforming, then to natural-gas companies in the Appalachian area with declining reserves, third to oil refineries for process heat, and finally to other large loads on an interruptible basis. It points out that there are 10 oil refineries now connected with the Big Inch lines whose combined fuel requirements equal about 140,000,000 cu. ft. of gas per day. At the present price of fuel gas, natural gas has a value of 3.3 cents per therm for refinery processing and 4.5 cents per therm for manufactured-gas reforming and cold enriching. On this basis the company estimates that these two uses alone will provide a market for at least 147.5 billion cubic feet of gas per year at satisfactory price levels.

Cost of Maintenance

As was required of all bidders, Texas Eastern agrees to maintain in standby condition all oil facilities not converted to gas use. It estimates this will cost it $215,000 annually, but it proposes to reduce this cost by leasing some of the storage tanks, lateral lines, and other facilities for oil use. It submitted a plan for connecting compressors to the two lines in such a way that they can be cut out and oil pumps cut back in within a few days so that either or both of the lines could be reconverted to oil use in time of emergency.

Texas Eastern's bid was submitted by Poe. The bid was as follows: Big Inch, $77,002,326; Little Big Inch, $66,124,674; total, $143,127,000. Listed as officers of the corporation are George R. Brown, Houston, chairman of the board; E. Holley Poe, New York, president; Charles I. Francis, Houston, vice president and general counsel; Herbert J. Frenzley, Houston, secretary-treasurer; and Hilding Carlson, New York, assistant secretary and assistant treasurer.

Directors are George R. Brown, Poe, Herman Brown, E. DeGolyer and Francis. Registered holders of more than 5 per cent of the outstanding common stock are Herman Brown, George R. Brown, DeGolyer, F. L. Andrews, Poe, Hargrove, Francis, and C. Douglas Dillon.

Texas Eastern has a commitment from Manufacturers Trust Co., New York, to lend the corporation $4,000,000 in which the City National Bank, Houston, will participate to the extent of $500,000.

Dillon, Read & Co., Inc., has studied the corporation's plans for the permanent financing of these properties as gas transmission lines, the bid said. Based on data currently available with respect to such factors as cost of conversion to gas-transmission service and construction of the necessary extensions to markets, supply, revenues, expenses and return, Dillon, Read & Co. has advised Texas Eastern that, if the project develops substantially in accord with such data, it is believed that, subject to satisfactory market conditions, the funds required can be obtained.

Texas Eastern expects to take over the interim lease now held by Tennessee Gas & Transmission Co. when it expires April 30 and to continue operation of the lines on substantially the same basis, supplying approximately 100,000,000 cu. ft. of gas per day to distributors in the Appalachian area. When compressors are installed and necessary connections made this will be stepped up to the line's estimated maximum capacity of 425,000,000 cu. ft. daily. The exact date when the daily throughput will be increased depends on the availability of compressor stations and other equipment. It's likely that upwards of 20 compressor stations will be needed. The two lines now have a total of 27 oil pumps.

Additional information on the announcement of the sale of the Big Inch system will be found as a part of Watching Washington.

O'Mahoney Report Reprinted

WASHINGTON.—Demand for copies of the final report of the special Senate committee on petroleum resources, known as the O'Mahoney report, is so great that the committee has already exhausted the supply available for free distribution. A reprint is being placed on sale by the Superintendent of Documents at 15 cents per copy or $64.95 per thousand.

Tide Water Gets Tanker

NEW YORK.—When Tide Water Associated Oil Co. takes title to S. S. "Chesapeake Capes," it will be the third of five T-2 tankers which the company is purchasing from the U. S. Maritime Commission. The ship will be renamed "Samuel Q. Brown" after the company vessel of that name lost during the war en route to the sonthwest Pacific with fuel oil for the Navy.

Nine Resolutions Adopted by ILO Petroleum Committee

LOS ANGELES. — The petroleum committee of the International Labor Organization wound up its 10-day meeting in Los Angeles last week by the adoption of nine resolutions, all calculated to improve government-management-labor relations with reference to petroleum in the member countries.

Six resolutions reported by Ambassador Roberto Cordova, Mexico's envoy to Costa Rica, who headed the subcommittee on vocational training, met only minor opposition. They covered basic worker education, facilities for vocational and technical training; recruitment of workers, promotion procedure, and apprentice training.

The resolution on recruitment providing that preference be given "workers of the country" in which an enterprise is located was amended to read "workers residing in the country" on suggestion of John Loftus, U. S. Government representative, who declared the U. S. Government wished it made clear no discrimination was intended against foreign workers.

The draft of a resolution prepared by the government group, calling for the collection and publication of comparative statistics in the respective countries on wages, hours of work, time lost in industrial disputes, etc., was withdrawn in the face of strong opposition from delegates representing management.

The subcommittee on general labor and social conditions in the oil industry, headed by Charles Bettelheim of France, successfully introduced a resolution on improvement of safety measures and one approving the principle of establishing a minimum wage in each country—the minimum to be determined separately in each country.

The committee report said discussion of a proposed 40-hour week resolution had been dropped in so far as the Los Angeles meeting was concerned when it became apparent that no decision could be reached.

Canadian Government Delegate R. H. Hooper submitted the management-labor-relations subcommittee report and single resolution. The conference approved the subcommittee's resolution reaffirming the right of labor and employers to form organizations of their own choosing and recommending maintenance of harmonious relations through collective-bargaining machinery.

Jef Rens of Belgium, secretary general of ILO, told the closing session that the meeting had been "extremely successful" and that the harmony with which the sessions had been conducted was noteworthy. Conference results have been transmitted to ILO headquarters in Montreal, and the resolutions which were adopted will later be referred to management, labor, and government groups in the member nations for ratification.

Synthetic-Rubber Problem Now Before Congress

WASHINGTON.—Adoption of a permanent synthetic-rubber program within the next few months has been requested of Congress in a special message by President Truman, but as yet no steps have been taken to tackle the problem.

The immediate issue is continuation, after March 31, of the allocation powers of the Second War Powers Act as regards rubber. This will permit the Government to keep in effect its present regulations limiting the percentage of natural rubber which may be used in tires and other articles, thus insuring a market for synthetic output. However, the legality of such wartime regulations would be subject to challenge if the supply of material rubber becomes adequate for all uses.

The president stated that the best information obtainable indicates that by the end of this year the production of natural rubber will be sufficient to meet world demands, so some other governmental machinery must be formulated before that time if the synthetic industry is to continue. The president strongly recommended to Congress the findings of the Interagency Policy Committee on Rubber (Batt committee) which made two reports last year.

Four Main Problems

If Congress follows the Batt committee suggestions it will first declare the policy of the Government to maintain a domestic rubber industry of the magnitude of 250,000 tons capacity per year, and then will tackle details of the four main problems in carrying out such a policy. These are:

1. Fostering research and development. How much research work should be done by the Government, and whether forced pooling of patents should be continued.

2. Plant disposal. Sale of some plants to private industry for continued operation, maintenance of others in standby condition by the Government, and junking of still others.

3. Creation of a government agency to supervise the rubber program and coordinate technical and other rubber activities of the various federal bureaus and agencies.

4. Methods to insure that synthetic rubber will be able to maintain a place in the face of declining prices for natural crude. The Batt committee explored various proposals, including a tariff on crude, import quotas, a sales tax on rubber articles graduated by the percentage of natural-rubber content, a government import monopoly, a certificate import plan tying import permits to purchases of synthetic, an industry code, direct government subsidy, and government specifications for rubber products somewhat like the present regulations. The Batt committee leaned strongly toward product specifications and direct subsidy, or a combination of both.

Union Postpones Strike Deadline

A THREATENED strike affecting the petroleum industry on the West Coast and operations of several other companies scattered throughout the rest of the nation was temporarily averted early this week when union leaders postponed the strike call for a second time to consider last-minute offers from the companies.

In Los Angeles, O. A. Knight, president of the Oil Workers International Union (C.I.O.), said several major companies boosted their offers to the union within "a few hours" before the second deadline of 10 a.m. Monday.

Earlier Shell Oil Co., Inc., extended an offer of an increase of 10 cents an hour and a cost-of-living bonus of $17.70 a month, an average raise of about 20½ cents an hour. The union is demanding a 25-cent blanket increase for its members.

In Fort Worth union officials met to discuss an offer of 22 cents an hour from The Texas Co. Delegates said it was believed the offer would be accepted if extended by the company to its workers on the West Coast.

The strike, if carried out, would affect field, pipe-line, or refining activities of 88 companies whose contracts with the union have expired. Of the 88 companies, 63 are in California.

this week

BIG INCH—WAA Administrator Littlejohn announces sale of Big Inch system to Texas Eastern Transmission Corp., high bidder with its $143,127,000 cash offer. . . . Texas Eastern, a new company headed by E. Holley Poe, expects to take over emergency operation from Tennessee Gas & Transmission April 30 and continue interim supply of about 100,000,000 cu. ft. daily until compressors and other equipment permit stepping up movement to maximum of about 425,000,000 cu. ft. daily. . . .

LABOR—C.I.O. Oil Workers Union postpones for a second time its strike deadline against 88 companies, 63 of which are in California. . . . Negotiations continue on West Coast with assistance of U. S. mediators. . . . ¶ILO petroleum committee winds up 10-day meeting in Los Angeles with adoption of nine resolutions which will be referred to management, labor and government groups of the 12 participating nations for ratification. . . .

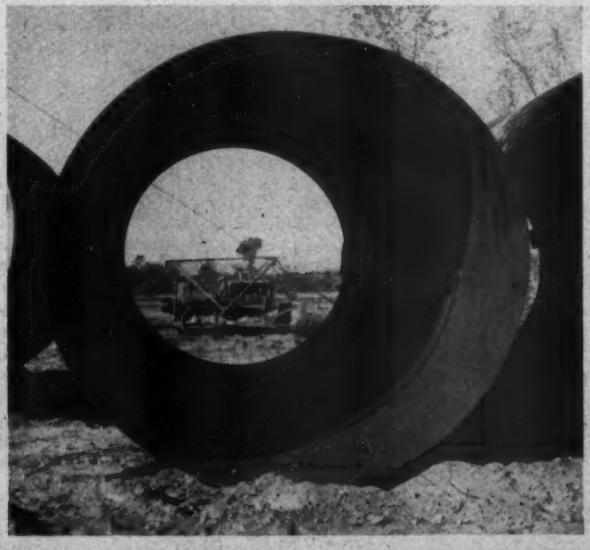
TANKERS—House passes resolution extending Maritime Commission authority to operate tankers until June 30. . . . House committee chairman declares authority will not be continued beyond this date unless reasons are overwhelming. . . .

NATURAL GAS—Columbia Gas & Electric's Charleston and Pittsburgh groups ask FPC approval of a proposed $25,492,000 expansion of system to increase gas supply to existing markets. . . . ¶United Fuel Gas and Ohio Fuel Gas, also subsidiaries of C. G. & E., request FPC authority for construction of 100-mile, 20-in. West Virginia-Ohio pipe line. . . . ¶Denver voters grant franchise as another preliminary to the construction of Colorado Interstate's 260-mile gas line. . . .

GOVERNMENT—Hallanan names council's statistical-advisory committee, announces next council meeting for April 22. . . . ¶OGD names Bradley Murray, formerly with PAW and later with Iranian-American Financial Mission, as consultant on organization. . . . ¶Lube-oil refiners protest action of Government in allotting 65,000 tons of tinplate in view of domestic can shortage. . . .

MARKETS—Bureau of Mines announces results of last summer's octane survey, showing drop in average rating of regular from 75.9 the previous winter to 74.4. . . . ¶Department of Commerce report shows 214,000 filling stations as of June 1946, a 25 per cent gain over the total of December 1943. . . . ¶Products markets continue strong except in East where burning oils show further price weakness. . . .

EXPLORATION—Imperial's wildcat shows brightest prospects of any well drilled in western Canada outside of Turner Valley. . . . Discovery south of Edmonton flows 40 bbl. per hour from Devonian lime. . . . ¶Weekly records of wildcat locations indicate intensive exploratory program during 1947 in California. . . . ¶The Texas Co. opens first commercial oil production in Zavalla County, Southwest Texas. . . . Wildcat 6 miles northwest of Crystal City flows 73 bbl. per day through 3/16-in. choke. . . . ¶Encroaching water delays completion of important Pettit lime discovery in De Soto Parish, North Louisiana. . . .



The "Biggest Inch"—the 30-in. pipe line which will carry Texas natural gas into metropolitan Los Angeles—will cross the Colorado River by air. At left a construction crew is seen driving a 12-ft. caisson which will serve as one of the supports for a suspension bridge over the Colorado for the new line. At right is a section of the caisson

International

WORLD-WIDE OIL DEVELOPMENTS

Colombian Minister Stresses Need For Improvement in Oil Policy

CREATION of an improved oil policy in Colombia is the foremost matter before the Ministry of Petroleum, according to T. E. Tascon, Colombia's minister of mines and petroleum, and it will be accomplished, he states, after the Consejo Nacional de Petroleos (National Petroleum Council) has given due study to the oil bill which has been pending before Congress since 1945.

Meanwhile, President Ospina of Colombia has appointed the two remaining members to the Consejo Nacional. They are: Dr. Gabriel Cuervo, chief of the technical-statistical section of the Ministry of Petroleum, and Dr. J. Bernal-Londono, civil engineer. Cuervo, a graduate engineer, studied petroleum engineering at Texas University. Bernal is well versed in management and industrial problems.

Other members of Consejo Nacional are: J. Jaramillo-Giraldo, formerly president of the Senate; J. J. Turbay, former congressman; and F. Mendoza, petroleum engineer and former technical adviser to the Ministry of Petroleum.

The council is expected to initiate a comprehensive study of Colombia's competitive position in supplying oil for the world market. And in doing this it is certain that the memorandum submitted by the interested oil companies in Colombia, suggesting certain amendments to the oil law along technical and economic lines will be thoroughly studied. By the time Congress meets July 20, it is expected that a modified bill will be drafted for presentation by the minister of petroleum.

Early this month Minister of Petroleum Tascon, commenting on the importance of establishing an oil policy in Colombia, said that "holding the oil bill in abeyance for a year and a half has held up the acceptance of oil-concession applications and the granting of concessions with the consequent adverse effects to the government oil revenues and the national economy."

The concensus in some quarters in Bogota is that Colombia's oil law, although subject to certain modifications to improve it, has been shown to be a workable instrument under which 110 wildcats have been drilled since 1935. However, many oil operators are hopeful that the revised bill will lessen the legal "red tape" in acquiring concessions and in particular the length of time required.

A 2 per cent royalty increase is almost a certainty. This means the present 2 to 11 per cent sliding scale would be hiked to a 4 per cent to 13 per cent scale. But neither the Barco, Casabe, De Mares nor other concessions already granted would be affected.

Chinese to Maintain War-Built Pipe Line

WHILE the postwar status of the India-China-Burma products pipe line remains uncertain, the Chinese National Highway Administration has been ordered to assume the management and care of the line, according to a Reuters dispatch from Shanghai. This line, built under the supervision of U. S. Army engineers, has not been used since the end of World War II.

The entire system, totaling approximately 3,500 miles, is not believed to have a commercial peacetime use although it proved of vital importance in waging war against the Japanese. A report some months ago indicated that the line might be traded or sold to British interests. However, the fact that the Chinese Ministry of Communication will keep the pipe line in an operating status and assign technical personnel to various sections of the line, indicates that the government may have other plans.

This line goes over mountain passes 9,000 ft. high and through some of the world's worst jungles in Burma. It is of both standard and portable types of construction. During the war, 80-octane gasoline, 100-octane aviation gasoline, and diesel oil were pumped from Calcutta to Kunming. The line consists of two 6-in. lines from Calcutta and Chittagong converging at Tinsukia in Assam; two 4-in. lines and a 6-in. line from Ledo to Burma; and another 6-in. line to Kunming.

W. C. Kinsolving, former assistant transportation director of Petroleum Administration for War and well-known pipe line expert, was instrumental in the construction of the line.

McGraw Gets New Guinea Construction Contract

HARTFORD, Conn. — Contract for construction which will pave the way for new oil activity in western New Guinea has been awarded by Royal Dutch Co. to F. H. McGraw & Co. The contract calls for construction of two piers and about 60 miles of jungle roads.

About 60 Americans and some 800 natives are expected to be employed when the project gets in full operation. Several wells were in production in the area before the war but were destroyed by either the Dutch or the Japanese.

Superior Officials in Bolivia

Jacques Adoue, attorney, and Walter Mengden, landman of Superior Oil Co., are in Bolivia studying the possibilities of an exploration arrangement with Yacimientos Petroliferos Fiscales Bolivianos (Bolivian Government Oilfields).

Russian Gas Line Opened

MOSCOW.—A 25-km. (about 15 miles) natural-gas pipe line, from the banks of the Terek River to Grozny, is now in use, according to Moscow radio. The industrial region of Starogrozneft reportedly will be the first to benefit from the new line.

New Guinea Exploration Programs Under Way

AUSTRALIA'S Commonwealth Government, which has a close interest in the exploration for oil in New Guinea and the jungles of Papua, is now giving financial assistance in development activities in these areas, according to the minister for external territories.

In a report from Sydney, Reuters News Agency states that in Papua (a British territory in southeast New Guinea), Anglo-Iranian Oil Co., Ltd., and Standard-Vacuum Oil Co. are operating through Australasian Petroleum Co. Ltd. A large percentage of Australasian Petroleum is held by Australian investors who are shareholders in Oil Search, Ltd. Drilling of one test, in Papua, is said to be beyond 5,000 ft.

Another company, Papuan Apinaipi Petroleum Co., Ltd., also is conducting exploratory and wildcatting operations. The commonwealth has rendered both financial and technical assistance to this company. The terms of repayment are said to involve a share in profits for the government.

A unit of the Royal Dutch-Shell is interested in the petroleum possibilities of New Guinea and reportedly is constructing roads and piers.

In addition, the Australian Government is preparing to conduct geological surveys and assemble other data for official maps which will be made available to interested companies.

Pemex Says Salamanca Project Not Abandoned

Construction of Mexico's Salamanca, Guanajuanto, refinery by Petroleos Mexicanos (Mexican Government Oil Administration) has not been abandoned despite reports to the contrary, Pemex officials state. Completion is planned for some time this fall. Delay in receiving certain necessary equipment from the United States resulted in a report that the work had been abandoned. Daily capacity of the refinery is slated to be approximately 27,000 bbl. The crude will come from Poza Rica.

Argentina Plans Expansion In Exploration, Refining

Reports from Buenos Aires say Yacimientos Petroleos Fiscales (Argentina's Government-Owned Oilfields) will intensify its search for oil in an area covering 600,000 sq. km. (about 325,000 sq. miles), as part of the government's 5-year plan.

Modernization of the La Plata refinery, currently running at 5,250 bbl. daily, is planned, and a program reportedly will be initiated for the construction of one or two new refineries. Four new tankers, 16,500 dwt. each, are to be added to Argentina's fleet, and three large tankers are to be modernized.

Continued Drop is Seen In Romanian Production

Lack of continued oil exploration has reduced Romania's production from an all-time high of more than 56,700,000 bbl. in 1938 to less than 31,000,000 bbl. in 1946. Romanian authorities expect a still further drop in 1947 and a production of little more than 25,500,000 bbl. in 1948, according to reports from Bucharest.

Even with new exploration work beginning immediately, authorities declared, no appreciable increase in production could be expected before 1949. Russia has had control of the operation of the Romanian oil industry since the country was occupied during the war.

Chinese Company Formed

A new company capitalized at approximately $180,000,000 (at the official exchange rate) was activated last week to develop an oil industry in China and to import foreign oil, according to Shanghai reports. First oil shipments from Iran already have been ordered, officials said.

International

Australian Refinery Resumes Operations

After a shutdown of nearly 5 years because of the war, Commonwealth Oil Refineries, Ltd., refinery at Laverton, Victoria, again is in operation following the recent arrival of the first shipment of crude from Abadan since January of 1942.

Now in progress is an equipment-reconditioning program expected to cost approximately $160,000. Commonwealth's shares are held by the Australian Commonwealth Government and the Anglo-Iranian Oil Co., Ltd.

Iraq Prince Named Representative

Iraq's Prince Sayyid Rauf Al Chapipji, former Iraq ambassador to London, has been appointed as government representative to oil companies holding concessions in Iraq.

Colon Development Output Up

CARACAS.—Venezuelan crude-oil production of Colon Development Co., Ltd. (Shell) was 436,916 bbl., or 14,563 bbl. daily, for the 4-week period ending February 3. This compares with 361,972 bbl. or 12,065 bbl. daily for the 4 weeks ending December 30.

EMERGENCY PIPE DELIVERY MADE BY AIR TO EGYPT

Probably the most expensive tubular steel pipe ever put in service is this planeload of externally upset cracking-still chrome-poly tubing, now a part of the Suez plant of Anglo-Egyptian Oil Fields, Ltd. When a recent failure shut down the refinery, Anglo-Egyptian officials sent a rush order for the tubing to Pittsburgh Steel Co. Production was expedited, and the order placed on a plane of the contract air-cargo division of American Airlines. The load was made up of 30-ft. sections of 5-in. o.d. tubing, and weighed 14,326 lb. The trip of 7,400 miles was made in 33 flying hours. Freight charges were more than six times the initial cost of the cargo. Picture shows workmen bracing the load to prevent the tubing from shifting during flight. Stops on the trip were made at New York; Gander, Newfoundland; Shannon, Ireland; and Rome

Filling a barge at the Port Jerome refinery, Rouen, France

French Refining Industry in Process of Repairing War-Damaged Properties

by A. A. Martin

International

IN 1939, France had 15 different refineries of which 12 had access to the sea, one was at the lower end of the Seine, and two were in the interior. One of these is located in the Pechelbronn field.

The entire group, having a capacity of more than 8,000,000 metric tons (56,000,000 bbl.) was adequate for the needs of France and, in part, for exportation to North Africa. (See Table 1, Column 1, and map). Those units, constructed between 1928 and 1935, were completed and modernized in 1938. At that time, an isopentane unit, a polymerization U.O.P., and a Houdry cracking (fixed bed) plant were being built.

At the beginning of the World War 2, they constituted a modern tool which served the purpose intended in peace and in war. Omitting the old Pechelbronn refinery, their value in 1939 amounted to 4,700,000,000 francs. To meet the need for 6,659,000 tons of petroleum products in 1938, the French refineries participated to the extent of 5,459,000 metric tons (38,000,000 bbl.). (Table 2).

Before and during the period of the liberation of French territory by Allied and French troops, the refineries were subjected to:

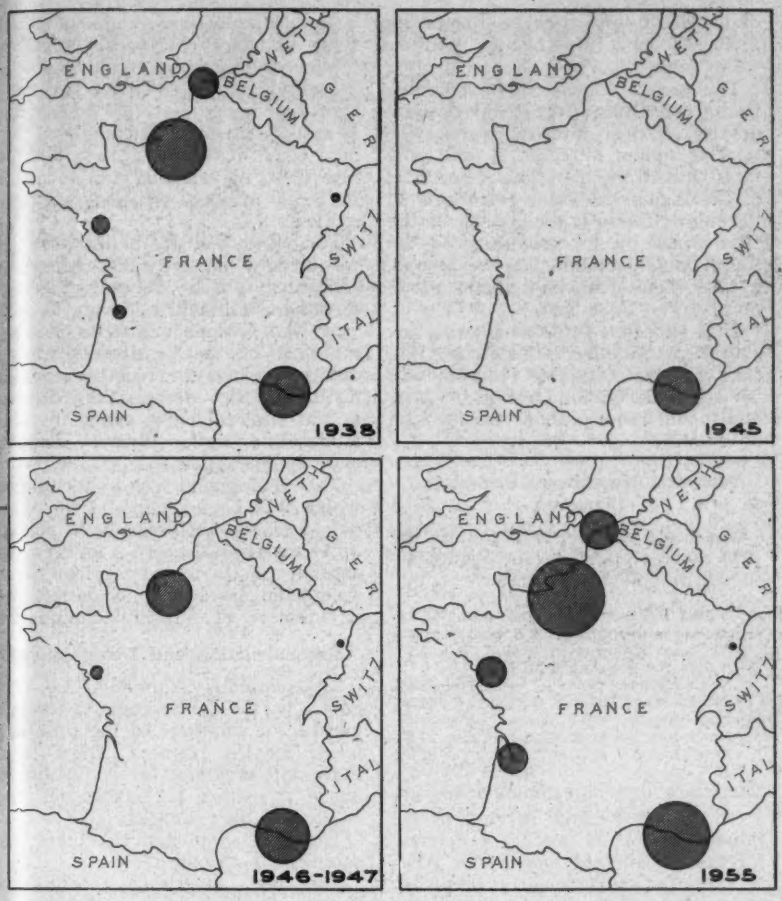
1. The conflagration of June 1940.
2. The dismantling and deportation effected by the Germans.
3. The bombardments of 1940 to 1944.

These reduced the immediate capacity to 2,000,000 metric tons (14,000,000 bbl.) (Table 1, Column 2, and map). The destruction amounting to 1,600,000,000 francs in 1939 (i.e., 30 per cent of the value) affected all parts of the installations but especially the reservoirs.

Only the three refineries of l'Etang

THE AUTHOR

A. A. Martin is a mining engineer and is currently chief engineer in charge of the technical department of Direction des Carburants of the Ministry of Industrial Production. (Similar to oil and gas division of the United States Bureau of Mines). A graduate of Ecole Centrale des Arts et Manufactures, and Ecole Nationale Superieure du Petrole, he worked in the laboratories of Prof. Henri Weiss at Strasbourg. Later he was engineer at Standard Francaise des Petroles (affiliate of Standard Oil Co. of New Jersey).



Throughput of French refining centers—present and projected

de Berre (Mediterranean) remained intact, while the one at Dunkirk (North) totally disappeared, and the two at Basse-Gironde were rendered useless by the bombardments of August 1944.

Results Achieved Up to October 1946

From September 1944 on, all reasonable efforts to put existing equipment back to work, then to repair by any possible means what could be saved of the damaged equipment, have been made in combined action of the government and the interested petroleum companies. The latter have followed the program agreed on with the administration.

An urgent need for reconstruction has made possible the expediting of departmental procedures, and very productively too, since the refining potential of 2,000,000 tons in August 1945 had risen to 3,000,000 tons by May 1946, and has now exceeded 4,000,000 tons (See Table 1, Column 3, and map). The sum invested in this effort amounts to a billion francs this year, and 75,000 tons of steel have already been used.

These results have been obtained by the mobilization of all possible means at our disposal; making the best of damaged equipment and sheet metal regained, importing material from the United States and England, recovering equipment from Germany. Imports from the Anglo-Saxon countries have, to date, cost $9,000,000 and £150,000 sterling.

To complete the program of repairs in the refineries planned for 1947, it will be necessary to import another $2,000,000 worth of equipment. This will permit the attainment of an annual processing capacity of 5,000,000 tons of crude. This is the objective for the initial phase of emergency repairs.

Future of Refining in France—The Monnet Plan

The French Government gave to Jean Monnet, well known in American business circles, the task of setting up a plan for the reconstruction and modernization of French industry.

Under his guidance, a commission—comprising directors of the petroleum companies, competent government agents, union representatives, and some technicians—has studied, and is laying the foundation for, the reorganization of refining activities of France.

Naturally, the conclusions arrived at have also been influenced by the existence of old refineries or what is left of them.

1. **The general problem of power in France.**—The problem of power facing the world at large has had repercussions in France. France has always imported coal, and in amounts which, during the 10 years preceding the war, ranged between 22,000,000 and 36,000,000 metric tons (i.e., about a third of the consumption). At the same time, in 1938, fuel oils aided in the production of power to the extent of 2,400,000 tons.

With regard to the fuel oil, particularly, the requirements for 1955

TABLE 1—GEOGRAPHIC DISTRIBUTION OF REFINING IN FRANCE

	Capacities in metric tons yearly			
	In 1938	After the liberation	Beginning of 1947	Forecast for 1955
Northern zone	820,000	.....	.....	1,420,000
Northwestern zone	3,820,000	.....	2,110,000	5,690,000
Western zone	320,000	.....	80,000	800,000
Southwestern zone	760,000	.....	.....	910,000
Southern zone	2,260,000	2,050,000	2,550,000	4,120,000
Eastern zone	140,000	.....	50,000	70,000
Total	8,120,000	2,050,000	4,790,000	13,010,000

TABLE 2—MOVEMENT OF PETROLEUM PRODUCTS IN FRANCE IN 1938

	In metric tons			
	Consumption		Resources	
	French internal consumption	Fuel for ships and exports	From French refineries	Imports
Gasolines	2,585,000	225,000	2,210,000	600,000
Gas oil	330,000	258,000	505,000	83,000
Fuel oil	1,270,000	1,135,000	2,005,000	400,000
Kerosene oil	122,500	90,000	210,500	2,000
Greases	270,000	16,500	194,500	92,000
Asphalt and pitch	305,000	.....	283,000	22,000
Liquefied gas	43,000	2,000	45,000	.....
Paraffins and waxes	7,000	.....	6,000	1,000
Total	4,932,500	1,726,000	5,459,000	1,200,000

were estimated to approximate 8,500,000 metric tons, of which 1,500,000 are for the bunkers. These figures are extremely high compared to those for the consumption of other petroleum products. This fact alone justifies a close study of the program for the future of refining.

2. **Consumption forecast of 1955.**—For other petroleum products, and with the above-mentioned reservations, the estimate of consumption takes into consideration the repaving of roads and the extension of automobile transportation. The forecasts for 1955, objective of the plan, are shown in Table 3 and reach 15,500,000 tons.

3. **Internal transportation conditions.**—A study was made recently of the economic state of internal transportation, and the conclusions drawn have greatly influenced the geographic placement of refineries to be reconstructed or to be modernized.

4. **Sources of supply of crude.**—In 1938, France imported 6,970,000 tons of crude oil, a figure surpassed only by England. Of this quantity, Iraq supplied 45.1 per cent, the United States 33.3 per cent, and the Venezuela-Colombia-Peru group 20.3 per cent.

This prewar orientation, and the survey of world reserves recently made, forced the French refineries to look toward the Middle East on one hand and toward the two Americas on the other for their source of supply. A change in the economic position of the Soviet Republic would necessitate a revision of this tendency.

The foreign affiliated groups in France will process their own crudes, which must be chosen from among the cheapest, in such quantities as can be bought with the government's available foreign currency.

The present output of Iraq and the Persian Gulf on one hand and of Venezuela on the other is already allocated. Their rebirth and their respective intensity greatly influence the setting up of new refining capacities forecast.

Finally, the plan has taken into account the necessity of importing certain quantities of finished products, either to control the price of crude and the cost of refining in France, or to complete the supply of certain products of which the present size of the refining industry does not permit production in sufficient quantities (additives for aviation, lubricants, fuel oil).

On completion of these studies, the refining plan proposed to the government envisions by 1955 the processing of 13,000,000 tons of crude, furnishing 11,500,000 tons of finished products (See Table 4).

The geographic distribution of refining capacities, from the viewpoint of the shortest internal transportation, is shown in Table 1 (last column) and on the map. The importance of the regions of Basse-Seine and of l'Etang de Berre is explained, for the first zone, by its proximity to the Parisian district and, in the second, by the Mediterranean region's proximity to the Near East.

It is expected that, considering installations already in existence, the cost of completing this program will be about 20 billion francs in 1946, and it will require about 450,000 tons of steel.

Technical Hypotheses Underlying Program

The basic hypothesis in considering 1955 sources of crudes for France assumes the following origins:

A. Crudes for lubricants and asphalts	
Colombian type (low cold test)	9.4%
Southern Venezuelan type	8.8%
B. Crudes for gasoline and fuel	
Near Eastern type	62.5%
Oficina type	19.3%
In other words:	
North and South American crudes	37.5%
Near Eastern crudes	62.5%

These are only approximate figures.

On the other hand, in view of the importance of the expected demand for fuel oil and the world-wide power situation, it is clearly necessary to acquire refining techniques giving as high a fuel-oil-gasoline ratio as is compatible with the quality of products desired and the probable specifications of crude.

TABLE 3—FRENCH REQUIREMENTS IN 1955
Internal and bunkerage requirements

	In metric tons
Motor gasoline	3,700,000
Aviation base	325,000
Additives for aviation	175,000
Kerosene	200,000
Gas oil (motor)	1,025,000
Gas oil (aviation)	200,000
Fuel oil, fluid	2,000,000
Fuel oil, heavy and bunker	6,500,000
Lubricants	400,000
Asphalts and pitch	750,000
Paraffins and waxes	10,000
Liquefied gas	130,000

TABLE 4—FORECAST OF MOVEMENTS OF PETROLEUM PRODUCTS IN FRANCE IN 1955

	In metric tons	
	Prod. in refineries	Imports
Motor gasoline	3,400,000	300,000
Aviation base	325,000	.....
Additives for aviation	125,000	50,000
Kerosene	200,000	.....
Gas oil	1,075,000	150,000
Fuel oil, fluid	1,285,000	715,000
Fuel oil, heavy & bunker	3,890,000	2,610,000
Lubricants	330,000	70,000
Asphalt and pitch	750,000	.....
Paraffins and waxes	10,000	.....
Liquefied gas	130,000	.....
Total	11,520,000	3,895,000

The Near Eastern crude, of which large tonnages will be processed in French refineries, presents the double characteristic of being paraffinic and of giving a relatively small yield of distillation fuel. To improve their pour point, it will be necessary to dilute them by cracking and to utilize in large measure visbreaking techniques.

For a first analysis of the problem, we foresaw on the one hand some refineries employing topping, reforming, visbreaking, and on the other hand, some refineries processing part of their crude by simple distillation and the rest by cracking distillates after deasphalting. In one or the other of these cases, the fuel oil-gasoline ratio always remains close to the whole

The equipment and techniques which will be used should be up to date and the refineries will possess unit capacities of about a million tons annually so as to keep prices to an acceptable level and to permit the exploitation of certain techniques.

Reconstruction and Development

The planning commission has proposed to the government a certain number of solutions to the problems posed by the refiners. These solutions will create a favorable atmosphere in which to reconstruct and modernize their industry.

The most important of these are summed up below:

The law governing refining in France as prescribed in the Act of 1928 give this industry the character of a public service. The groups satisfying the obligations described by this law must be placed in the same category, whether they are entirely French or not, because they are agencies of the state and all at the service of the country.

In France, the necessity of using the most modern refining techniques, the present insufficient national production, and the large number of sources of petroleum controlled by foreign groups, make it necessary to eliminate any nationalization policy for refineries belonging to such groups. National preferences are not to be considered in this matter but rather the necessity of economic exchange between peoples, an exchange where petroleum holds an important place.

Foreign affiliated groups in France will be accepted in the light of their economic power and technique and of the good will and the scope of our relations with them. Whenever it will be to their interests, France will encourage those who desire to import crude.

All these companies, French or foreign, will find satisfying security and remuneration for their capital, in proportion to their technical contribution and to the aid they will give France in her need for petroleum.

WASHINGTON WATCHING

BY HENRY D. RALPH

A Problem Solved

WASHINGTON.—Big Inch has been sold, assuming that no unforeseen hitch arises, thus relieving both the Government and the oil and gas industries of a great big problem.

The Government gets a very handsome return, is relieved of maintenance costs, and no longer has to listen to arguments over the best use for the lines.

The oil industry is relieved of the threat that the lines might be used for oil in such a way as to disrupt the economy of refining and marketing in the areas traversed.

The gas industry is relieved of the threat that some bidder might pick the lines up for a song and disrupt competition.

All industry is relieved of the threat of government operation or a socialistic type of mutual cooperative.

The successful bidder is backed by men who know the gas business and who have adequate financial and technical support. There is no reason to suspect that the venture will go bust, as was the case with some of the vague and speculative proposals in the first batch of bids last summer. The winning bid is a purely orthodox and business-like proposal.

There might still be some monkey wrenches heaved at the works, but at the moment it looks as though the Big Inch problem has been settled once and for all.

Remaining Obstacles

TEXAS EASTERN TRANSMISSION CORP. is over its first big hurdle in getting acceptance of its bid for the Big Inch lines, but it still has a number of other obstacles in its path.

First of these is getting a certificate of public convenience and necessity from the Federal Power Commission. Before war FPC publicly expressed disapproval of transmitting Gulf Coast gas to the Atlantic Seaboard. However, the War Production Board practically forced it to approve the Tennessee Gas and Transmission system, and since then it has approved several new long lines and extensions to others, though none right through the coal-producing areas nor into the heart of the coal markets. Undoubtedly coal and rail interests will fight, but it is hard to see how FPC can turn thumbs down when another branch of the Government has sold the lines for gas use.

Then there are the right-of-way obstacles imposed by the states of Louisiana and Pennsylvania. Ostensibly they prevent Louisiana gas from being used in the line or any gas from going through Pennsylvania. But the lawyers all say that under the Constitution no state can interfere with interstate commerce in this manner. Texas Eastern might have to go to court about it, but should win on the showdown. If necessary, Congress could grant right of eminent domain to the line, or to any project authorized by FPC. Significantly, none of the bidders appeared apprehensive on this point.

Most intriguing point is whether or not Texas Eastern paid too much for the line. Some of the other bidders think so. Included in the property is between $12,000,000 and $20,000,000 worth of oil-pumping and storage equipment which the purchaser must maintain in standby condition at a cost of some $215,000 annually. The question is: will FPC permit the company to include this in the rate base on which earnings of 6½ per cent are permitted?

It is interesting, and perhaps significant, that the bid of Texas Eastern exceeded all other valid bids by just about the estimated value of the unusable oil facilities. Perhaps the other bidders felt FPC would not permit inclusion of these properties in the rate base, while Texas Eastern is betting that it will.

Most gas men, including some of the unsuccessful bidders, believe Texas Eastern can sell plenty of gas at rates sufficiently high to yield a good return on the investment, though a few feel that the purchase price is so high that wholesale gas rates will be out of line with those of other transmission companies and will meet resistance from purchasers and the FPC. However, the line reaches virgin territory so far as natural gas is concerned, and the company doubtless can find customers willing to pay much more than gas costs in some other parts of the country.

Fast Disposal Action

THE individual most pleased with the sale of Big Inch is War Assets Administrator Robert M. Littlejohn.

Declaring that his job is to sell property at the best price obtainable, Littlejohn brushed aside all quibbles over social effects and political influences, junked the timid disposal policies of his predecessors, braved vocal minorities in Congress, and readvertised the lines on a basis that permitted only firm and unequivocal bids.

As a result the Government gets $143,000,000 cash on the barrel head. It is far and away better than the best offers made at the original bidding last summer. All those who bid on both occasions offered much more the second time, due to the definiteness of Littlejohn's terms of sale.

The speed and decisiveness with which the administrator acted is most unusual in government.

Littlejohn's press conference to announce the sale was one of the shortest on record. A few reporters tried to heckle him a bit, but soon gave up.

"Isn't this the fastest deal WAA ever made?" one asked.

"And the best," snapped the grissled ex-general.

"Did you give consideration to coal interests?"

"I considered everybody, particularly the taxpayers."

That ended it.

Tanker Box Score

THE U. S. Maritime Commission has sold 101 surplus tankers under the Ship Sales Act, delivered 42 of them, has pending applications to purchase 19 more, and has 456 still available for sale, according to its quarterly report to Congress.

Most of these sales were of the T-2 type tanker. Only five of the more modern T-3 type have become available for sale, and these were sold very promptly. The lag between sales and deliveries is due to the log-jam in ship repair yards, for the commission must remodel vessels to remove their wartime features. The commission reported that the ship sales program is going very well and that it expects to sell another 60 fast tankers during 1947.

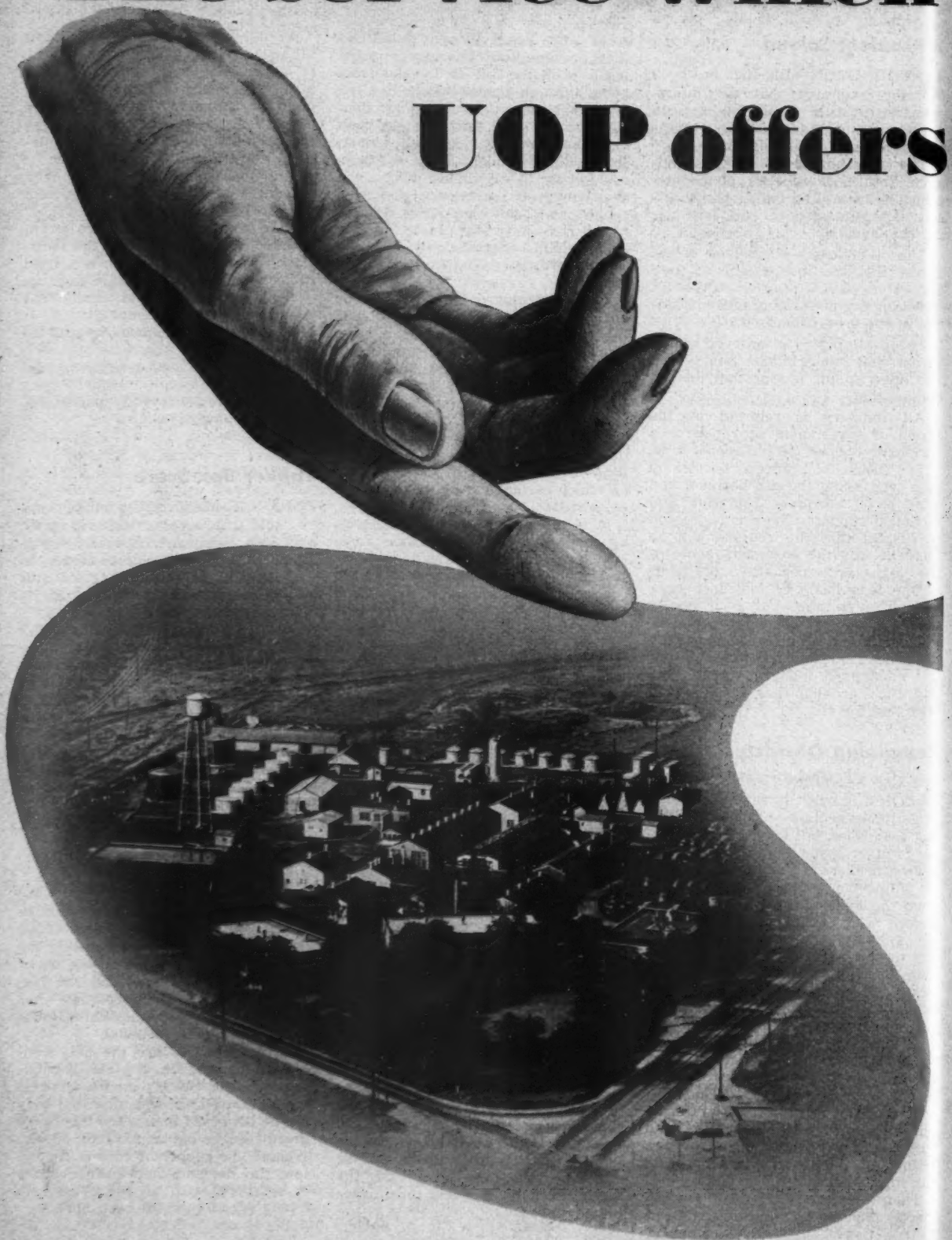
Tinplate for Export

THE Government's recent action in allocating an additional 65,000 tons of tinplate for export during the current quarter has roused the ire of lubricating-oil refiners, and the National Petroleum Association has lodged protests with the White House and the State Department.

Export controls are the only controls remaining on tinplate distribution and use. Since domestic controls were removed, refiners find that they are no better off than when they were given meager quotas for lube oil and grease. The supply of cans is far below the demand, and refiners have to scramble with all other users to

(Continued on page 114)

The service which UOP offers



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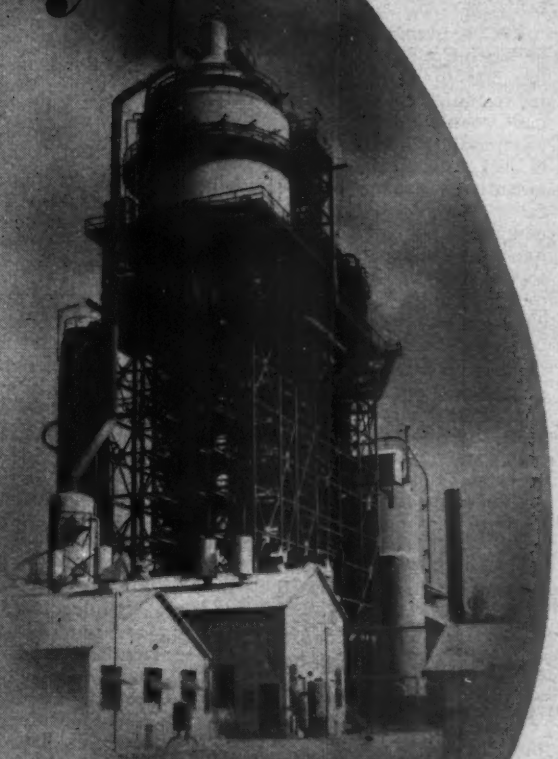

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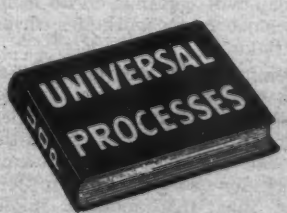


get a few. So NPA thinks no exports should be allowed.

Most of the 65,000 tons is allocated to foreign food packers and other specific uses, but 6,500 tons of the total is unallocated, which means that some foreign refineries may be able to get a few cans for lube oils.

Gas-Act Amendments

THE natural-gas industry may attempt to get the jump on the Federal Power Commission by submitting to Congress its own proposals for extensive amendment of the Natural Gas Act.

FPC is plugging along with its job of writing a summary of the lengthy hearings in its gas investigation and in formulating its own conclusions and recommendations for legislation. Completion of this project, however, is still several months away. In the meantime, industry opinion has been fairly well crystallized, and several company lawyers have tried their hands at drafting revisions of several sections of the law. Some of these quite likely will be tossed into the congressional hopper by sympathetic congressmen.

Such action might have the effect of speeding up the FPC report, and should also sharpen the issues and force the commission to take a forthright stand on all matters in controversy. However, it probably will not speed up final legislation, because Congress is not apt to take action until FPC states its position, and that will be too late in the current session for action before the summer recess.

Synthetic-Fuel Research

TWO schools of thought are developing in the oil industry toward the Bureau of Mines research into synthetic liquid fuels, it would appear from discussions at the Bureau's industry advisory committee here last week.

Some of the advisers feel that the Government should confine itself largely to fundamental research in basic problems, leaving to the industry the task of applying the findings to plant practices. Others encourage the bureau to go ahead with plans for pilot and demonstration plants on a semicommercial scale in order to get all the kinks out of the various processes. The upshot is that the bureau will continue to do some of both, since much work lies ahead in both fields.

The committee showed great interest in a preliminary report on the bureau's latest experiments in dry hydrogenation of powdered coal without the use of solvent or fluid carrier. Work done so far on this project indicates that this method might prove to be more economical than any other. There was also general satisfaction in the opinion expressed by bureau engineers that modern American engineering applied to the hydrogenation process may soon bring costs down to or below the cost of producing liquid fuels by the Fischer-Tropsch process.

The meeting was largely an exchange of information and comments between industry and government technicians with the view of keeping public and private research programs running along parallel rather than conflicting paths. Bureau men noticed that there was very free discussion of many points but almost complete silence when others were mentioned, from which they infer that some of the industry researchers are on the point of making valuable and patentable discoveries which they do not care to have bruited about at this time.

The discussion was confined to coal liquefaction. Oil shale was not discussed because the bureau's oil-shale demonstration plant at Rifle, Colo., will open May 1 with a conference at which this subject will be gone into thoroughly.

More Middle East Operators

THE possibility that two or three of the larger independent oil companies may become interested in Middle East oil concessions is looked on with much favor by the State Department, which is said to feel that its diplomatic efforts abroad will be improved if they are conducted for the benefit of more companies.

Diplomatic scouts report that there are some reasonably attractive prospecting areas in the Middle East where the governments concerned might be willing to talk concession, such as Yemen and the neutral zones between Kuwait and Saudi Arabia.

It is understood that Superior Oil Co. of California now has a man in Cairo making a preliminary investigation, and that Phillips Petroleum Co. has made some inquiries at the State Department. Other companies mentioned, without confirmation, as being interested in the possibilities of new concessions in the Middle East are Amerada and Seaboard of Delaware.

The "Tideland" Case

THE Supreme Court argument on ownership of submerged oil lands is now scheduled for March 12, the State of California having requested more time to answer the Department of Justice brief which claims that the federal Government has title to all the ocean bed beyond the low tide mark.

The state's rebuttal brief should be filed soon, and also the court will be asked to permit the National Association of Attorneys General to intervene. The legal officers of Louisiana and Texas particularly are anxious to give all possible assistance to California in this controversy, because a victory for federal claims to the Pacific's bed would certainly lead to a like assertion regarding the Gulf of Mexico from which these two states obtain handsome oil royalties.

Although resolutions have been introduced in both House and Senate to abnegate all federal claims, Congress shows little disposition to take any action prior to a Supreme Court decision. Senator Alexander Wiley of Wisconsin, new chairman of the Senate judiciary committee, has tried to stir up his group to beat the Supreme Court to the draw, but the majority of the committee prefers to wait and see what the Nine Old Men have to say. The reasoning is that if the Department of Justice loses the case Congress won't have to do anything, but if the court says the Government owns the land then Congress will be free to hand it over to the states.

A Study of Statistics

REVAMPING the Government's oil and gas statistics is the current project of the interdepartmental petroleum coordinating committee, which has had a couple of meetings on the subject recently.

Under the prodding of the Oil and Gas Division, this group is studying the statistics put out by various agencies of the Government, first to see what is available now, second to discover what statistics the Government itself needs or wants, and third to suggest improvements in their collection or compilation.

A special committee of the National Petroleum Council has been authorized to assist the OGD in this work, particularly to advise on what statistics the industry is now publishing, what additional data the industry would like, and the best means of collating government and industry figures.

Fuel-Oil Ration Data

A STATISTIC may be the tail light on a train you just missed, but the Oil and Gas Division has found that many oil companies are much interested in statistics it has compiled on fuel-oil rationing during the late war.

Fuel oil was rationed between June 1944 and May 1945, in eight regions, and while this is rather ancient history the ration records provide the only statistics on local distribution and use. By correlating these figures with current data on fuel-oil production and population growth it is possible to work out estimates of the present demand in the more important fuel-oil consuming areas of the country.

WAA Hopeful for Ultimate Sale of All U. S. 100-Octane Plants

by Henry D. Ralph

WASHINGTON.—The War Assets Administration is making rapid progress in liquidating the Government's war-built 100-octane aviation-gasoline plants and related facilities.

Instead of being peacetime white elephants, as was assumed when they were built, much of the equipment is being put to commercial use and there is a good prospect that all of it will be sold within a reasonable length of time.

Little, if any, of the equipment is being used for its original purpose of making 100-octane gasoline, but most of it seems destined for some use in the petroleum or chemical industries. Some units, particularly catalytic-cracking plants, have been sold to their war-time operators for use in place for production of motor gasoline. Others have been "canabalized"—broken up and the parts sold separately. Some are being leased for experiments in converting them to produce commercial products.

The significant thing is that 18 months after the end of the war there are negotiations actively under way for all but one of the remaining projects. The single exception is the isolated 100-octane plant operated by Associated Refineries at Beckett, Okla., which is unique in that it is not close to any basic refinery, but WAA is receiving some interesting "nibbles" even on this plant.

Subject of Negotiations

Every other plant listed as still unsold is the subject of current negotiations in various stages of advancement, and WAA has high hopes of selling them all within a few months.

In almost every case the negotiations are with the wartime operator. This is because the government equipment was located inside or adjacent to the operator's refinery and depends of it for feed stock and various services, making it of little use to anyone else.

There is no hope that the Government will recover a major portion of the approximately $232,000,000 it invested in aviation-gasoline facilities, but neither will this investment be a total loss. The usual form of lease requires the operator to pay maintenance, taxes, and insurance charges on the entire property plus commercial rent on the equipment actually used. Some equipment, such as catalytic-cracking plants, has been sold for prices close to replacement cost, discounting wartime features and the extra construction costs which prevailed when they were erected. Units of limited commercial use, such as alkylation plants, are sold on a discount formula based on the anticipated load factor. Others, such as butane-isomerization units, which apparently have no commercial use, are sold at salvage value, which is usually considerably above the scrap-metal price. In selling a plant containing mixed facilities, WAA usually insists on a salvage warranty requiring the purchaser to canabalize or scrap all equipment not sold specifically for use in place. This is to prevent the purchaser from obtaining a useable plant at a low cost which would give him an undue advantage over competitors.

Since outsiders are seldom interested in buying this equipment, the usual procedure is for the operator to drop a hint that he might be willing to buy it, particularly if WAA makes a move toward offering it for sale as salvage. Sparring around for an acceptable sales price then is apt to continue for months in a rather listless way until WAA sets a "cut-off date" for submission of a firm bid. This generally results in a definite bid, but usually too low for acceptance, so WAA makes a counter proposal. These proposals then become the basis for real negotiation and the final sales figure may be somewhere between the two.

This absence of spirited bidding for the plants makes their sale a slow process, but so many of the idle plants are now in or close to the final stages of negotiations that WAA officials are very optimistic that the bulk of their selling job will be completed in the relatively near future.

Status of Plants

Following is a tabulation of the Government-built aviation-gasoline facilities showing the wartime operator and present status.

J. S. Abercrombie and Magnolia Refinery Co., Sweeney, Tex., the only complete refinery, isolated from other facilities, in the Government's program, built at a cost of $27,987,000. Shut down for more than a year, negotiations for purchase are now under way, with a cut-off date of February 17 for submission of bids.

Anderson-Prichard Refining Corp., Cyril, Okla.; intermingled equipment costing $245,000, sold to Anderson-Prichard.

Ashland Oil & Refining Co., Catlettsburg, Ky.; cracking plant adjacent to and dependent on operator's basic refinery, costing $16,500,000; now being operated by Ashland on an experimental 1-year lease in an attempt to convert the plant to commercial products.

Associated Refiners, Inc., Beckett, Okla.; isolated cracking plant dependent on feed stocks trucked from local refineries; cost $14,865,000; shut down, and no serious negotiations under way.

Bay Petroleum Corp., Denver, Colo.; intermingled equipment costing $138,000; sold to operator.

Continental Oil Co., Ponca City, Okla.; cracking plant adjacent to and dependent on feed stocks from operator's refinery; cost $16,452,000; negotiations under way, cut-off date to be set soon.

Cooperative Refining Co., Coffeyville, Kans.; cracking plant adjacent to operator's refinery; cost $6,016,000; operator offered $1,120,000 which WAA rejected as inadequate, and negotiations are still in progress. Meanwhile operator is leasing certain parts and has converted the isomerization unit to catalytic polymerization.

Crown Central Petroleum Corp., Pasadena, Tex.; cracking plant adjacent to operator's refinery; cost $16,063,000; operator using parts of the plant on lease and shows interest in purchasing entire property.

Eastern States Petroleum Co., Houston; cracking plant adjacent to operator's refinery; cost $10,351,000; operator using portions on lease and shows interest in negotiating to buy entire plant.

Frontier Refining Co., Cheyenne, Wyo.; adjacent cracking plant; cost $7,892,000; operator using portions on lease, negotiating to purchase entire property, and WAA will set cut-off date soon.

Great Southern Corp., Corpus Christi, Tex.; adjacent alkylation and reforming units; cost $11,172,000; sold to Rubber Reserve Co. for butylene production.

Humble Oil & Refining Co., Baytown, Tex.; hydrogenation unit inside operator's refinery; cost $4,368,000; canabalized and equipment sold in pieces, Humble purchasing most of it.

Mohawk Petroleum Corp., Bakersfield, Calif.; alkylation, isomerization, and reforming units adjacent to operator's refinery; cost $4,680,000; leased for 5 years to Oronite Chemical Co., subsidiary of Standard Oil Co. of California, for experimental production of chemicals.

Pan American Petroleum & Transport Co., Texas City, Tex.; miscellaneous equipment inside operator's refinery; cost $3,873,000; operator leasing small portion and shows interest in negotiating for purchase of entire property.

Pennoil Co., Oil City, Pa.; adjacent alkylation unit; cost $4,485,000; sold in entirety to Koppers Co. for chemical manufacture, for $1,250,000.

Premier Oil Refining Co., Cotton Valley, La.; adjacent alkylation and dehydrogenation units; cost $6,450,000; now producing butylenes for rubber program.

Pure Oil Co., Smiths Bluff, Tex.; adjacent alkylation unit; cost $3,415,000; shut down; Pure submitted a purchase offer in January which was declined; WAA made counter proposal which is still under consideration.

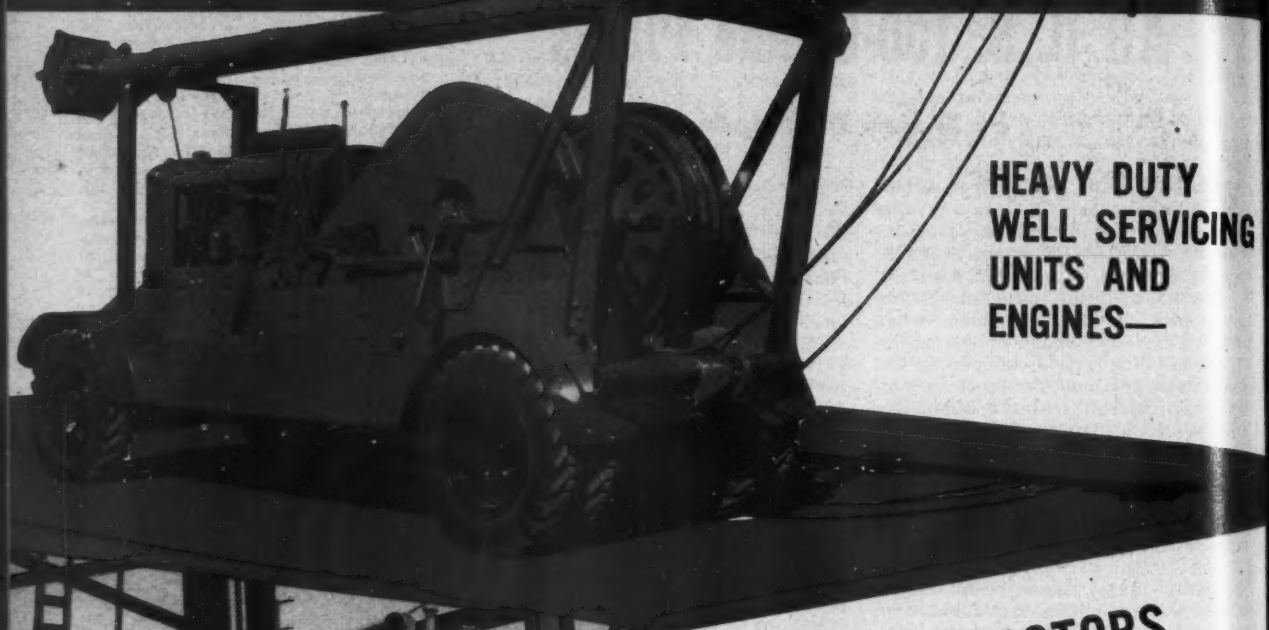
Republic Oil Refining Co., Texas City, Tex.; adjacent cracking plant; cost $11,234,000; Republic using portion on lease and shows some interest in negotiating for purchase of entire property.

Root Petroleum Co., El Dorado, Ark.; cracking plant inside operator's refinery; cost $6,219,000; operator using products on lease; recently made purchase offer of $1,100,000 for entire property, which is still being considered by WAA.

Southport Petroleum Co. (now American Liberty Oil Co.), Texas City, Tex.; adjacent cracking plant; cost $11,543,000; shut down; operator currently negotiating to purchase.

Standard Oil Co. of California, Richmond, Calif.; adjacent cracking and related facilities; cost $21,348,000; leased to operator, who is actively negotiating for purchase.

A-C Model L



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Standard Oil Co. of New Jersey, Baton Rouge, La.; inside hydrogenation unit; cost $3,520,000; approved for canabalization and sale of equipment piecemeal.

Utah Oil Refining Co., Salt Lake City, adjacent cracking plant and related facilities; cost $15,382,000; operator has purchased the catalytic cracker and utilities for use in place, personal property at appraised value, alkylation facilities at a large load-factor deduction, and remainder at salvage, for a total of approximately $5,000,000. The loading rack and butane storage at Fort Laramie, Wyo., has been sold to Stanolind Pipe Line Co.

Wilshire Oil Co., Norwalk, Calif.; cracking unit and other facilities inside operator's refinery; cost $8,561,000; shut down; WAA now considering bids of $500,000 from Wilshire and $1,350,000 from Earle Gard.

In addition WAA has sold, chiefly for salvage, four facilities built early in the war by the Reconstruction Finance Corp. under escrow contracts; a butane isomerization unit costing $3,743,000 operated by Champlin Refining Co. at Enid, Okla.; a butane isomerization unit costing $2,793,000 operated by Cities Service Oil Co. at East Chicago, Ind.; a small isopentane plant operated by Continental Oil Co. at Wichita Falls, Tex.; and a small B-B extraction unit operated by Socony-Vacuum Oil Co. at East St. Louis, Ill.

Also, WAA has sold or leased all three of its aviation-gasoline catalyst plants and sold the Baytown Ordnance toluene plant to Humble Oil & Refining Co. with no restrictions on its use or junking. It still has three toluene plants for which there probably will be no market except as salvage.

Bureau Report Shows Extent of Octane Drop

LAST summer's severe shortage of tetraethyl lead coupled with government restrictions on gasoline quality forced a 1.5 drop in the octane rating of regular grade and 2.6 in premium grade throughout the country.

This was revealed in a Bureau of Mines report on its semiannual survey of the quality of motor fuel available in the nation's filling stations last summer. Average A.S.T.M. octane of regular was 74.4 compared to 75.9 the previous winter; the average of premium was 78.3 against 80.9 the previous winter.

The report showed that octane number last summer, though down from the record-high level of the first postwar winter, continued substantially above wartime ratings which in the summer of 1945 were 74.9 for premium and 69.7 for regular. The report of last summer's octane average, twentieth of the series, was based on 3,011 samples representing 113 major and minor companies and obtained in 233 cities in 40 states.

Though the bureau's report confines itself to last summer's ratings, the lead-supply situation has improved slightly in recent months, and average octane at the present time is believed to be somewhat above that of 8 months ago. Though supply is far below demand, Ethyl Corp. for March is allotting 115 per cent of the June-November 1946 base. Late in December, the Civilian Production Administration lifted the 89.5 maximum allowed for octane of premium grade and production from catalytic-cracking equipment has lifted octane ratings particularly on the Gulf Coast and in the East.

The survey was made in cooperation with the coordinating fuel research committee of the Coordinating Research Council, Inc., and the samples were analyzed in the laboratories of 17 contributing organizations.

Included in the bureau report, which was compiled by O. C. Blade, petroleum chemist at the bureau's petroleum experiment station, Bartlesville, Okla., is a map showing the number of samples taken in 159 localities in the 21 marketing districts. In addition to octane values, the report gives data on gravity, sulfur content, Reid vapor pressure, research octane number, and distillation figures.

The accompanying table summarizes by district octane numbers for premium and regular gasoline:

	Premium		Regular	
District—	Winter 1945-46	Summer 1946	Winter 1945-46	Summer 1946
Boston	80.9	78.6	76.9	75.9
New York	81.3	78.9	76.9	76.6
Washington, D. C.	81.3	78.7	76.7	75.8
Pittsburgh	81.1	78.3	76.8	75.4
Cleveland	80.0	78.2	76.0	75.1
Detroit	80.0	78.0	75.6	74.1
Atlanta	81.2	79.5	76.9	75.4
Memphis	80.7	78.3	76.2	75.4
Chicago	79.7	78.1	75.1	73.5
New Orleans	81.2	78.3	76.4	75.8
St. Louis	80.0	78.4	75.1	74.0
Minneapolis	79.5	78.0	74.9	73.0
Omaha	79.9	77.3	75.1	73.0
Tulsa	79.5	77.7	75.1	72.9
Texas	80.6	78.8	76.2	74.4
S. Rocky Mt.	80.5	77.7	75.4	73.7
Middle Rocky Mt.	79.4	77.7	74.3	72.1
N. Rocky Mt.	79.5	77.3	74.1	71.9
Seattle	84.4	79.2	76.1	75.4
Los Angeles	84.1	78.6	76.4	74.3
San Francisco	84.3	78.3	77.1	74.9
Average	80.9	78.3	75.9	74.4

Expanding Oil Business Predicted by Holman

HOUSTON.—Eugene Holman, president of Standard Oil Co. (N. J.), last week predicted an expanding oil business during 1947 in the United States as well as throughout the world.

Here with F. W. Abrams, chairman of the board, and John R. Suman, a vice president, for a series of meetings with Humble Oil & Refining Co. executives, Holman said the rapidity with which Europe again began using oil in large quantities surprised Standard officials.

Holman said he favors continued development of new methods for producing synthetic petroleum products, and at the same time an "aggressive" oil industry with "plenty of wildcatting" to increase the known oil reserves of this country.

Oil Compact Marks Twelfth Birthday

OKLAHOMA CITY.—The Interstate Oil Compact Commission this week passed its twelfth birthday.

It was created in Dallas February 16, 1935, with the signatures of representatives of nine states following earlier meetings called by Gov. E. W. Marland of Oklahoma. It since has grown to include 17 member states which produce 90 per cent of the nation's natural gas and 80 per cent of its crude oil.

Motor-Carrier Movement Of Products Shows Gain

Transportation of petroleum products by motor carriers in December 1946 increased 2.4 per cent over the preceding month and 17.3 per cent over December 1945, the Research Department of the American Trucking Association has reported.

COSDEN BEGINS SHIPMENTS UNDER NEW RATE PLAN

History was being made by this switch engine when the above photograph was taken of the first trainload of petroleum products ever shipped in the United States under a multiple-car freight-rate policy. Texas & Pacific Railway instituted the new trainload rate, about 40 per cent below single-car shipment rates, to forestall construction by Cosden Petroleum Corp. of a pipe line paralleling the railroad. Here, the switch engine is transferring the tank cars from the Cosden refinery loading rack at Big Spring to the T. & P. classification yard

Product Demand Good in Interior; Eastern Burning Oils Weaker

THE market in distillate burning oils this week varied from continued extremely active trading in the interior to further weakness on the Eastern Seaboard where suppliers described the situation as "the sloppiest in 20 years."

Through the Mid-Continent and Midwest, burning oils continued in heavy demand and were reported moving at prices ranging from ⅛ to ⅜ cents above published quotations. Kerosene of both grades, where available, was ⅛ cent above the market low.

Reports on tank cars differed. One source reported some improvement, but several refiners were said to be running several hundred cars behind in unfilled orders. Slow railroad movement, particularly in such areas as Milwaukee which for a time embargoed certain rail shipments, continued to trouble oil-company traffic officials.

Last week's curtailment of gas deliveries to industrial customers in some Middle West and Pennsylvania areas reacted in additional inquiries for heavy fuel oil. Little was available in the Mid-Continent, however, and that at prices ranging upward from the market high of $1.39 per barrel.

The New York heating-oil market was in sharp contrast to that in the Midwest and Mid-Continent. For the fourth time in recent weeks, Socony-Vacuum Oil Co., Inc., cut its No. 2 price at all levels in metropolitan New York. Harbor prices were reduced 2/10 cent to 5.9 cents tank car and 5.8 cents barge. High inventories and weather some 20 per cent warmer than last year have depressed East Coast burning oils since last autumn. Other New York suppliers met Socony-Vacuum's reductions.

Kerosene Quotations

Kerosene also was moving at lower quotations in New York. Four suppliers reported ¼ cent reductions in harbor prices following the action of Standard Oil Co. of New Jersey in reducing postings to 6.75 cents tank car and 6.65 cents barge, effective February 12. Residual continued tight at new higher prices, but some easing in the heavy off-season demand for gasoline was reported in New York.

Gasoline demand in the Midwest and Mid-Continent remained relatively heavy for the season with larger companies buying to improve their inventory position. Indicative of the motor-fuel demand was the continued active movement of natural gasoline, which was firm at existing prices of 5⅛ cents Oklahoma and 4⅞ cents North Texas.

In New York, Petroleos Mexicanos announced the price of Bunker C fuel oil at the ports of Tampico and Veracruz had been increased from $1.48 to $1.53 per barrel as of February 10.

Another clue to the reason for the unexpectedly heavy postwar consumption of motor fuel was given in Detroit by R. L. Polk & Co., automotive - industry statisticians. The firm emphasized that the anticipated scrappage rates during the war failed to materialize. Registration in 1946 totaled 25,142,527—only 9.23 per cent under 1941, despite the fact that passenger-car scrappage over a 20-year period prior to the war averaged 1,897,764 vehicles a year.

Program Announced for Tulsa A.S.M.E. Meeting

Thirteen technical sessions on various phases of engineering will highlight the spring meeting of the American Society of Mechanical Engineers, to be held in the Mayo Hotel, Tulsa, March 2-5.

General - session speakers include Dr. Harold Vagtborg, president of the Midwest Research Institute, Kansas City, and John J. Grebe, Clinton Laboratories, Oak Ridge, Tenn.

Technical sessions of particular interest to petroleum-industry representatives and speakers include:

Petroleum session: George Roberts, chief of the Stanolind Oil & Gas Co. laboratory, Tulsa; R. G. Watts, Magnolia Petroleum Co.; and R. M. Stuntz, Gulf Oil Corp., Tulsa.

Oil and gas power session: W. J. Ewbank, chief research engineer, Briggs Filtration Co., Bethesda, Md., and Stephen Bencze, steam-turbine development engineer, Elliott Co., Jeannette, Pa.

Management session: H. G. Thuesen, head of the department of industrial engineering, Oklahoma A. & M. College, and A. F. Lyster, manager of the industrial department, Socony-Vacuum Oil Co., Inc.

Fuels session: W. A. Hagerbaumer, mechanical engineer, Socony-Vacuum Oil Co., Inc.; Russell Lee, Socony-Vacuum Oil Co., Inc.; W. T. Reid, Battelle Memorial Institute; and J. F. Snuggs, Standard Oil Co. (Ind.)

Industrial instruments and regulators session: O. E. Barstow, Dow Chemical Co.; C. M. Bryant, Dowell, Inc.; Paul G. Exline, section engineer, and H. J. En Dean, engineer, Gulf Research & Development Co.

Engineering education session: Charles W. Crawford, head of the mechanical engineering department, Texas A. & M. College; Eugene F. Dawson, director of the school of mechanical engineering, University of Oklahoma; and Douglas Ragland, Humble Oil & Refining Co.

Murray Gets OGD Post

WASHINGTON.—Director Max W. Ball of the Oil and Gas Division has appointed Bradley Murray as consultant on organization.

DEATHS

Jerome G. Kilgore, 66, former independent refiner and associated in the past with several refining organizations, died February 11 at his home in Wichita Falls. He was one of the organizers of the old American Refining Co. and later was associated with Panhandle Refining Co.

Edward McAdams, 61, independent operator who drilled the discovery well in Kettleman field, California, and is credited with taking the first rotary equipment to that state, died February 7 in Big Spring, Tex.

Warner Norton Grubb, 46, area adviser for northern Europe, Standard Oil Co. (N. J.), died February 14 at his home in New York. Grubb began his oil career with Atlantic Refining Co., and joined Jersey Standard in 1933. During the war he was a commander in the Navy and was both a member of the Army-Navy Petroleum Board and executive officer of the Allied Tanker-Coordination Committee.

George Hardy Lilly, 53, president of Lilly Brokerage Co. and vice president of Hoosier Petroleum Co., Inc., died February 12 at his home in Indianapolis.

W. L. Wohn and **H. A. Burton,** officials of Tropical Oil Co., and **Carl Hubman** and **J. K. Hufendick,** officials of Texas Petroleum Co., were killed February 15 in the crash of an airline near Bogota, Colombia. Wohn, a retired army colonel, was chief of the construction department for Tropical. Burton was serving as coordinator of North American personnel for Tropical.

Emmett R. Toler, 47, district agent of Gulf Refining Co. in Winnsboro, Tex., died February 13 in Longview, Tex., of injuries sustained in an automobile accident.

Dr. F. B. Plummer, 61, member of the petroleum-engineering faculty of the University of Texas and widely known geologist who recently returned from several months' exploratory work for the Brazilian Government, died February 17 in San Marcos, Tex.

Walter R. Jarrett, 60, former independent operator and head of Jarrett Petroleum Co. in Oklahoma City until 1937 when he went to Midland, Tex., as district land man for Anderson-Prichard Oil Corp., died February 16 in Midland.

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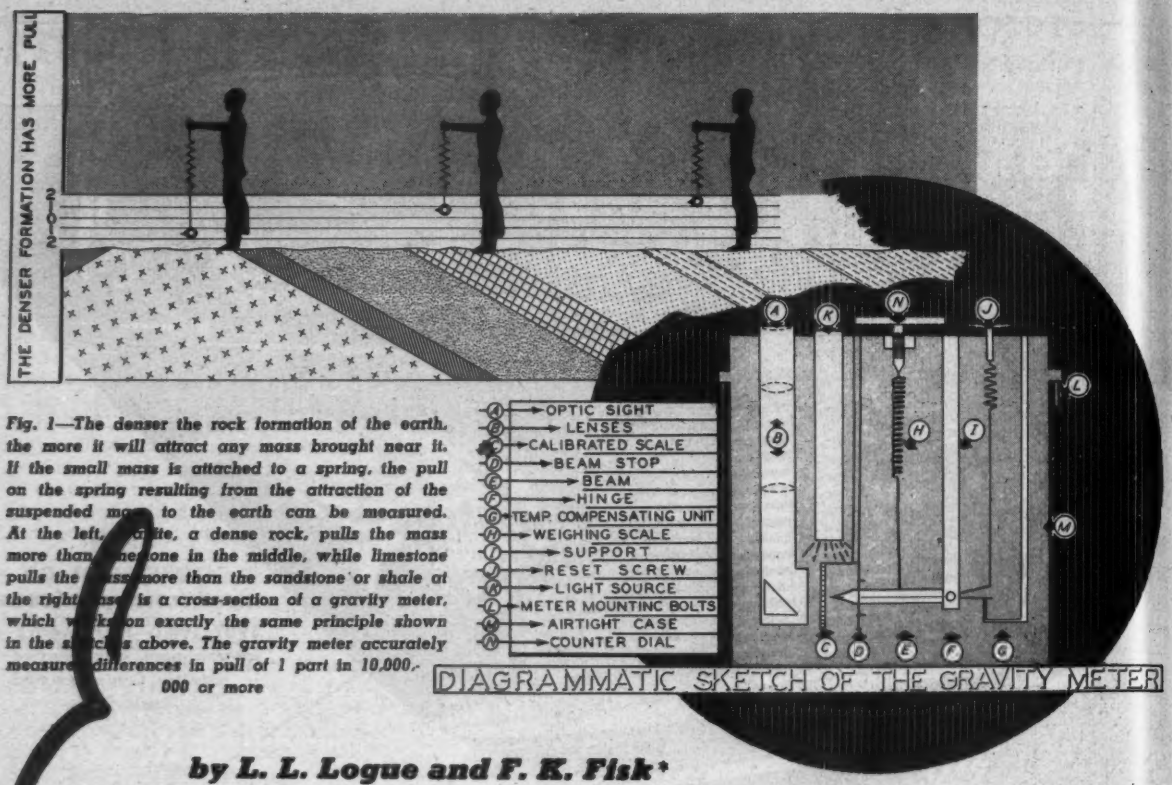


Fig. 1—The denser the rock formation of the earth, the more it will attract any mass brought near it. If the small mass is attached to a spring, the pull on the spring resulting from the attraction of the suspended mass to the earth can be measured. At the left, granite, a dense rock, pulls the mass more than limestone in the middle, while limestone pulls the mass more than the sandstone or shale at the right. Inset is a cross-section of a gravity meter, which works on exactly the same principle shown in the sketch above. The gravity meter accurately measures differences in pull of 1 part in 10,000,000 or more

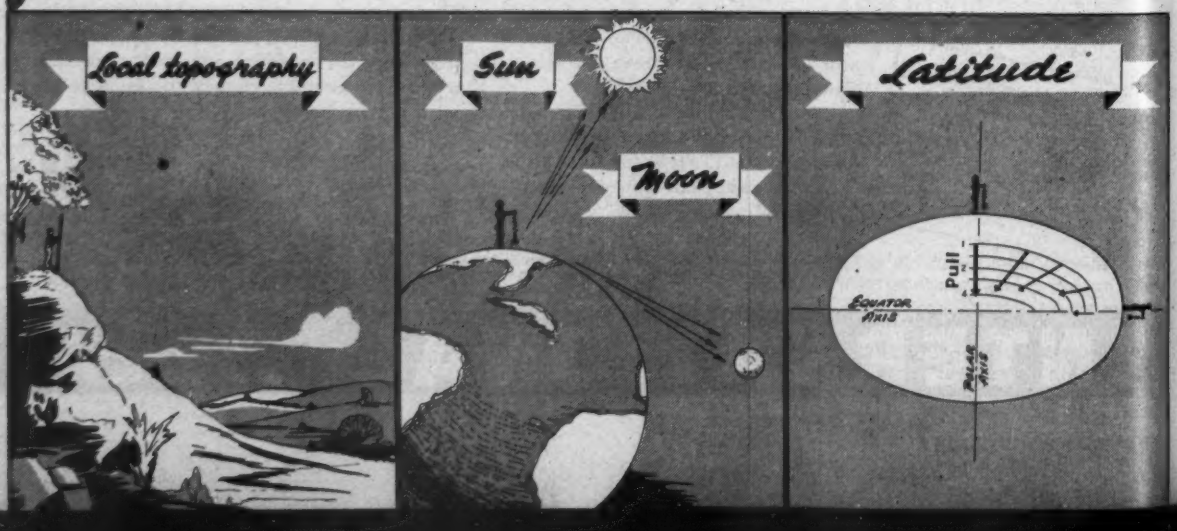
Exploration and the Gravity Meter

by L. L. Logue and F. K. Fisk*

THE gravity meter (or gravimeter) is a geophysical instrument, widely and successfully used in the search for new oil fields. While everyone knows a little about the law of gravity, few people are aware of the fine points of difference in its local effects. The gravity meter measures these tiny local differences and uses the information to find promising areas for oil exploration. In the hands of a skilled operator and interpreter, it can successfully detect local differences of 1 part in 10 million or more in gravitational effects.

Fig. 1 shows in exaggerated scale, some of the things in the earth that result in very small, but measurable

*Exploration Surveys, Inc., Dallas.



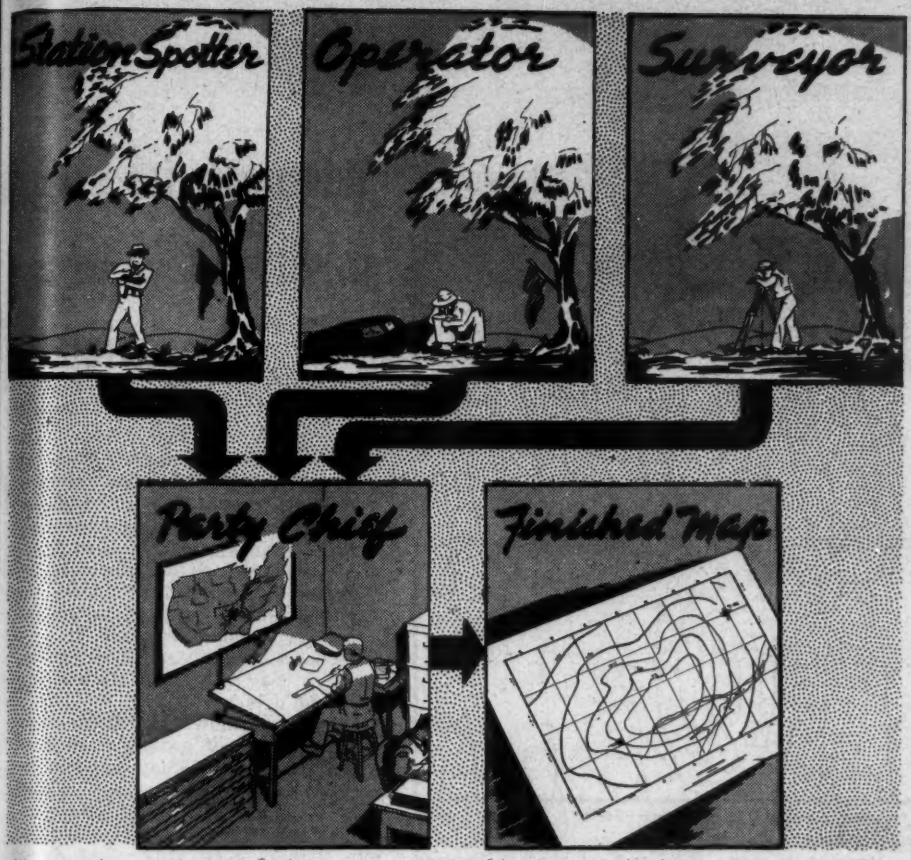


Fig. 3—(Left) This is how a typical gravity-meter party operates. One station spotter goes ahead and picks out good locations. The gravity-meter operator and his assistant follow, set up the instrument, and take a reading. They are followed by a survey party, performing the same functions as any surveying party tying in the spot to a base map and determining its elevation. It usually requires two surveying parties to keep up with the graviety-meter operator. All of this information flows to the field party chief, who coordinates the work and interprets it into a regional gravity map. The speed with which gravity work can be done is emphasized by the fact that it requires two survey parties to keep up with one operator and one station spotter

Fig. 4—(Below) Note that observed map reflects large features; elimination of regional effect brings out smaller structural aspects

differences in the gravitational effect at the earth's surface, and a diagrammatic sketch of a gravity meter. Fig. 2 shows the three correction factors that must be used in all gravity meter recordings. Fig. 3 shows how a typical gravity-meter party operates.

After a gravity survey party's observations have been corrected, the work reflects the variations due to geological conditions. The party chief then interprets the work in terms of regional geology and draws the first

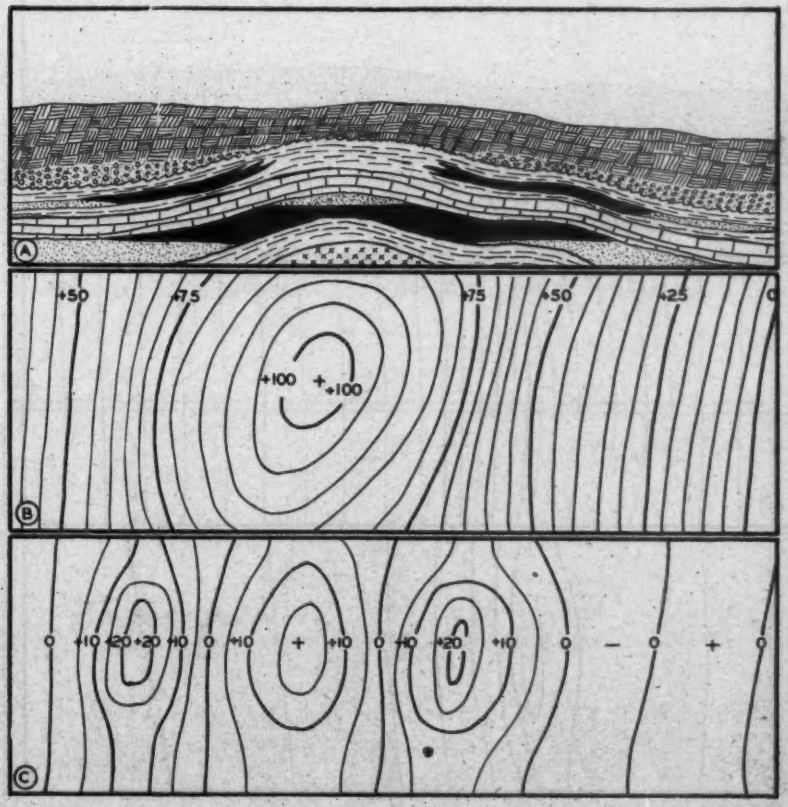


Fig. 2—(Bottom, opposite page) All observations of gravity effects must have three correction factors applied. Variations of elevation on the earth's surface, due to hills and valleys, must be taken into account, and all measurements corrected to what they would read if made on a perfectly flat surface. The gravitational effect of the sun and moon is reflected in ocean tides as everyone knows, but they also affect the earth, so a correction is made for this. Most people know the earth is not a perfect sphere, but bulges a little at the equator and flattens a little at the poles. The exaggerated sketch at the right shows how this affects the gravitational effect at the surface. Therefore a third correction must be made, varying with the location of the observation point north or south of the equator

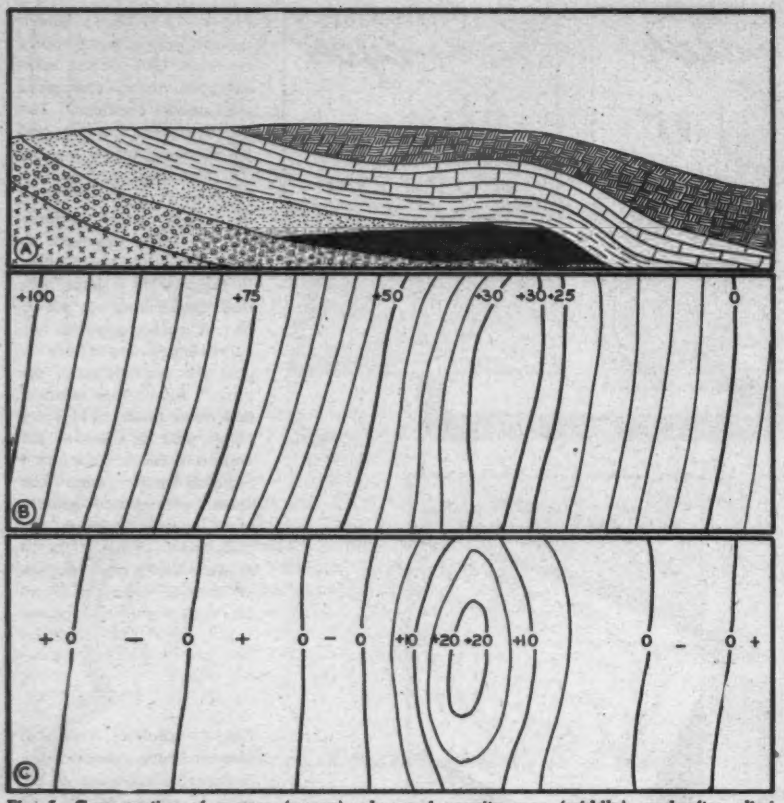


Fig. 5—Cross-section of a nose (upper); observed gravity map (middle); and after elimination of regional effect (lower). On lower map, crest of nose has higher unit value, although structurally lower than formation to west. When regional effect is removed, changes in gradient are shown, rather than maxima and minima readings

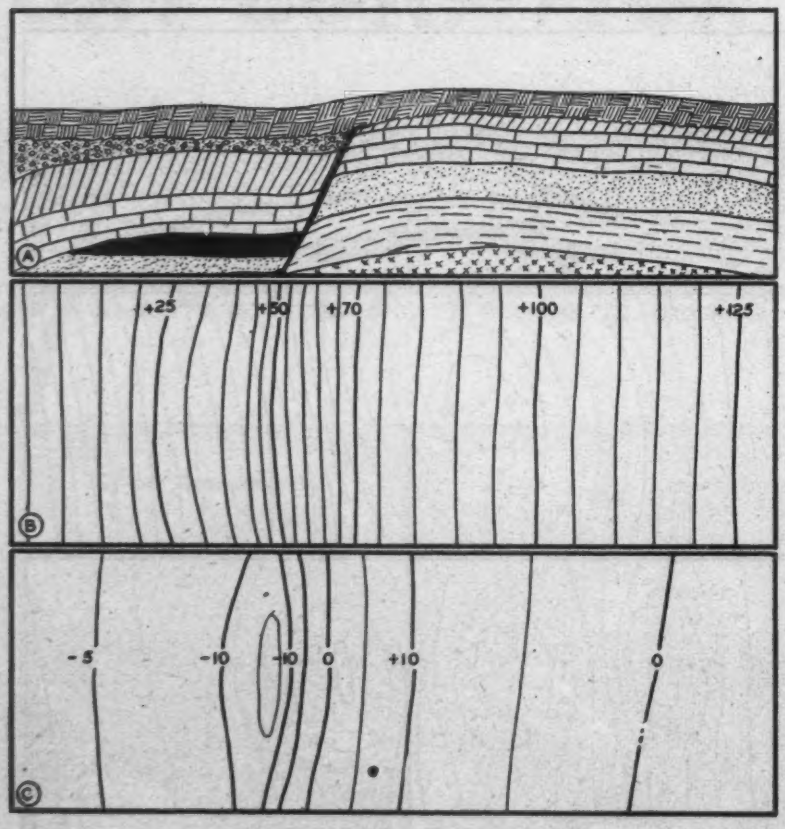


Fig. 6—Cross-section of a normal fault (upper), with observed gravity map (middle), and after elimination of regional effect (lower). Note on middle map how contours tighten approaching the fault. In lower map the abrupt drop in gravitational value is accentuated, and closure on downthrow side of fault is indicated by minus value

Judgment in elimin n of gravity effect is key good of gravimeter ta .

map. However, the real goal of the work is to determine the probable local highs on the regional high, so the next step is to determine how much of the gravitational effect measured is common to the whole region and then to subtract this from the observed data. This is called "elimination of regional effects." It is a process of magnifying local differences so that they stand out and can easily be detected.

Figs. 4 to 8 show some of the more common types of geology associated with oil fields. Immediately below the geological cross-section is a typical gravity-effect map, prior to elimination of the regional effect. The bottom strip of each illustration shows the final picture, after elimination of the regional effect permits the local highs and lows to stand out clearly.

Practical Use of Gravity-Meter Data

The gravity meter is not a magic instrument. It simply gives evidence about certain types of geological information that cannot be obtained as quickly or cheaply by any other method. It is primarily a reconnaissance tool (with a few special exceptions), which can do a good job of eliminating the areas least promising for oil. At the same time it points at areas worth checking by more detailed, but more expensive methods, such as the seismograph.

n of the regional good interpretation ta . . . .

Gravimetric data have to be interpreted into direct geological data. Therefore the value of the final product depends on accurate field work, plus all the direct geological evidence obtainable from other sources. The combination of these into a finished product by a skilled, intelligent interpreter with sound judgment, provides valuable information for oil men.

Suggested Program

In the opinion of the authors, too many oil operators, particularly smaller independents, are failing to cut their wildcatting costs as low as they could if they made proper use of gravity-meter work. It offers a cheap and quick geophysical method of separating the wheat from the chaff, so that an operator can concentrate his time and money on the most promising areas.

An ideal exploration program for any area would be as follows:

1. A gravity survey.
2. Preliminary geologic study of the area.
3. Seismograph survey of the most promising spots.
4. Correlation of gravity, geological, and seismograph data for final interpretation and evaluation.
5. Location of the wildcat test.

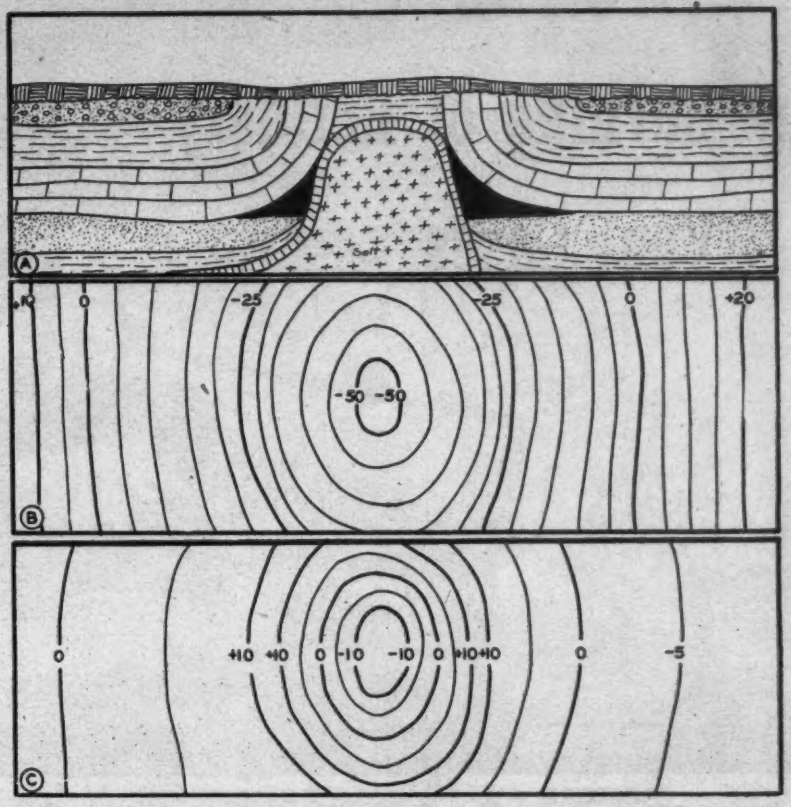


Fig. 7—Salt dome, represented on observed map by gravity minimum, due to lesser density of salt compared to surrounding sedimentary rocks. In derived map, denser sedimentary rocks pushing closer to surface on sides of salt, result in plus values rising sharply approaching dome, then dropping quickly to negative values over the salt

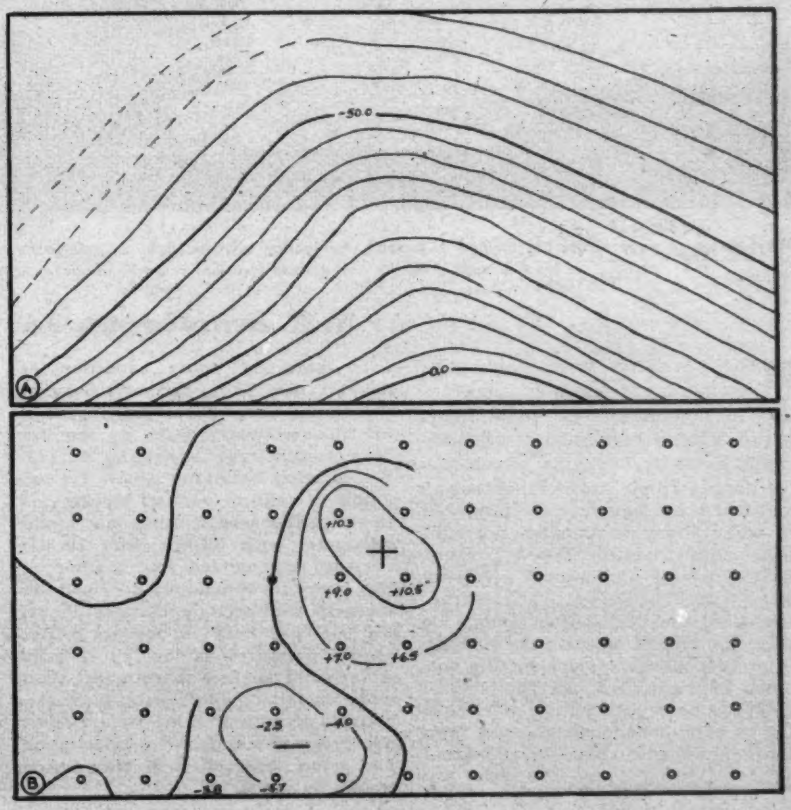
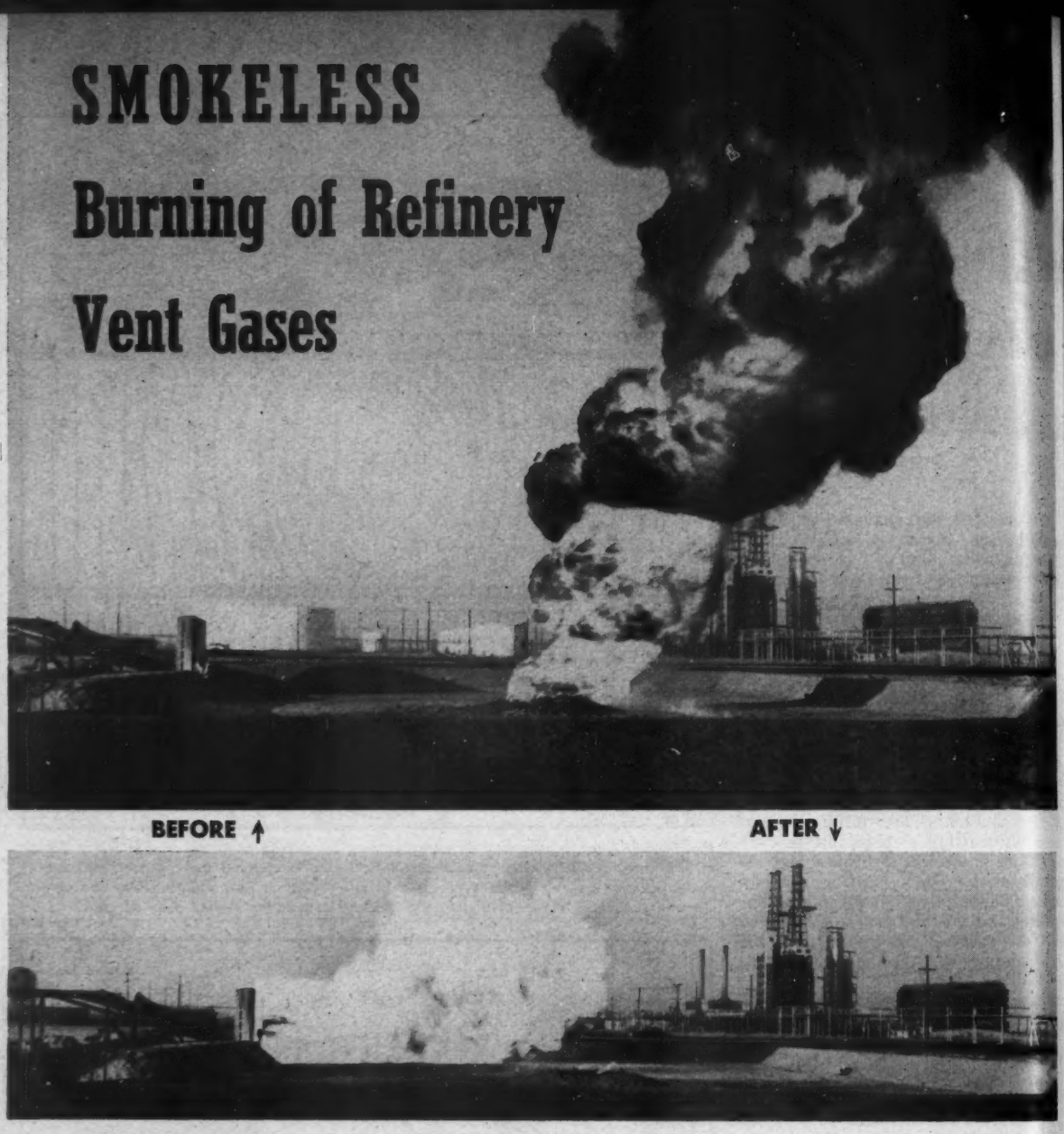


Fig. 8—(Right) Actual observed gravity map of a North Texas oil field, and the derived map after elimination of regional effect. Practically all production falls within the plus 5 contour on the derived map. Small circles on derived map represent grid employed by authors in mathematical solution of problem of elimination of regional effect

SMOKELESS Burning of Refinery Vent Gases



View at top of page shows old method of burning emergency released light oil and gases which, due to lack of aeration, created clouds of black smoke. With the new burner installation smoke is absent, as shown in lower view

by A. K. Brumbaugh, Jr.*

MANY refineries located in metropolitan areas face a severe problem in the disposal of waste light-hydrocarbon materials, especially those gases and liquids which are discharged from safety relief valves and which consequently are produced in widely varying amounts not subject to direct control. This is particularly true of operations involving large gas-recovery, light-end-fractionation, and alkylation units; for such equipment requires the holding in process vessels of considerable volumes of hydrocarbons. The special problems associated with materials in the propane-hexane range result from a combination of volatility at normal temperatures and vapor density appreciably greater than that of air; the high volatility means that discharged material may not be readily condensed, for example by water washing, and the high vapor density slows down dispersion by natural forces and encourages the formation of pockets of gas.

*General Petroleum Corp.

To abate any "smog" conditions at its Torrance, Calif., refinery, General Petroleum Corp. developed a system for burning waste gases by the use of a venturi-type aspirating burner. For burning isobutane vapors for example, a ratio of venturi throat area to gas-orifice area of 4 to 1 was found adequate; with up to about 20 per cent of unvaporized hydrocarbon in the gases it was found necessary to increase this ratio to 16 to 1. Flame did not "pop back" to the gas orifice at gas pressures as low as ⅛ psig. A series of burners of different sizes were installed, controlled automatically to go into and out of service as gas pressure varies. The installation has given satisfaction in eliminating smoke nuisance.

Most operators of this type of equipment have concluded that the only safe method of handling such vented material is burning. Early in 1946 General Petroleum Corp. instituted a program aimed at the development of equipment which would burn gases without objectionable smoke. The following discussion outlines the basis of this development and describes the installation recently completed.

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Only 25 of Original 29 Defendants Are Still in Court
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Sohio Discovery Reported Tanking 5,000 Barrels Daily
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SOHIO GUSHER TO BE TESTED
Eyewitness to Thursday's Sensational Flow, Says Estimates Were True
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It was SSC's privilege to provide the Three Dimensional Reflection Surveys which led to the drilling of this Discovery Well.
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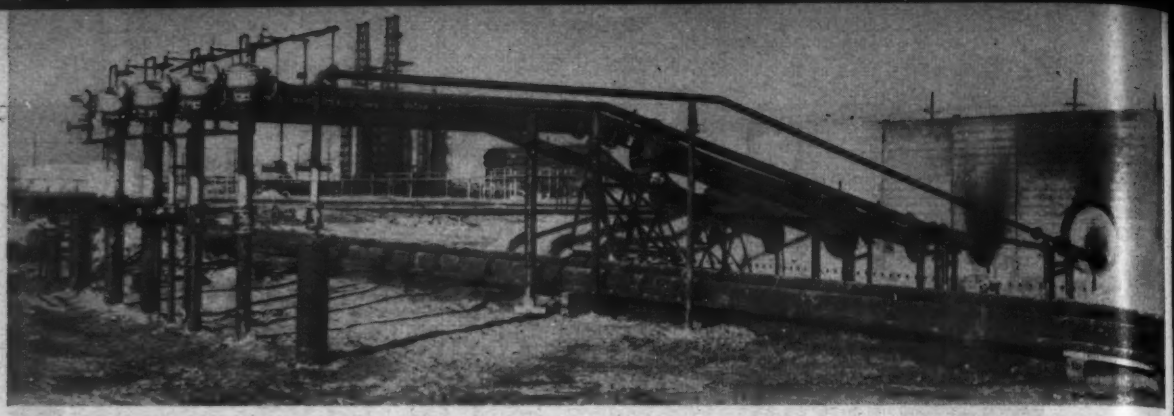
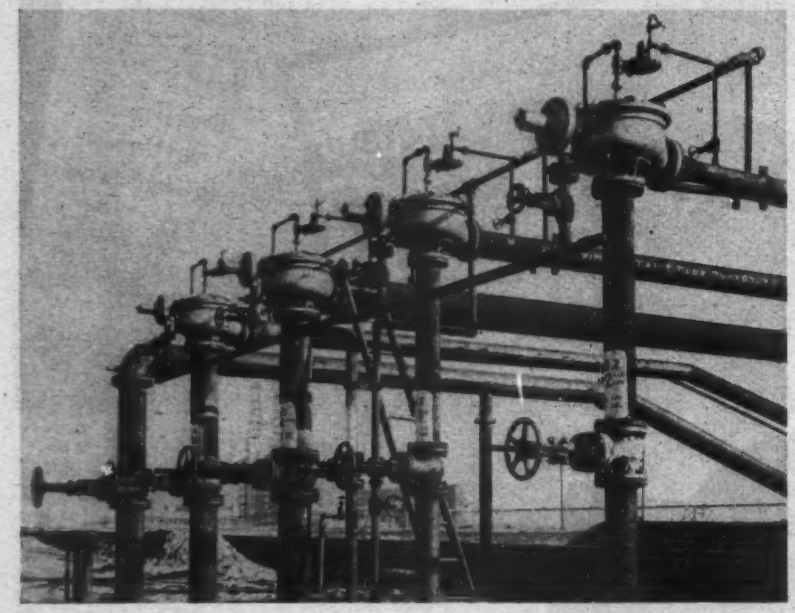


View of regulator manifold and piping of burners

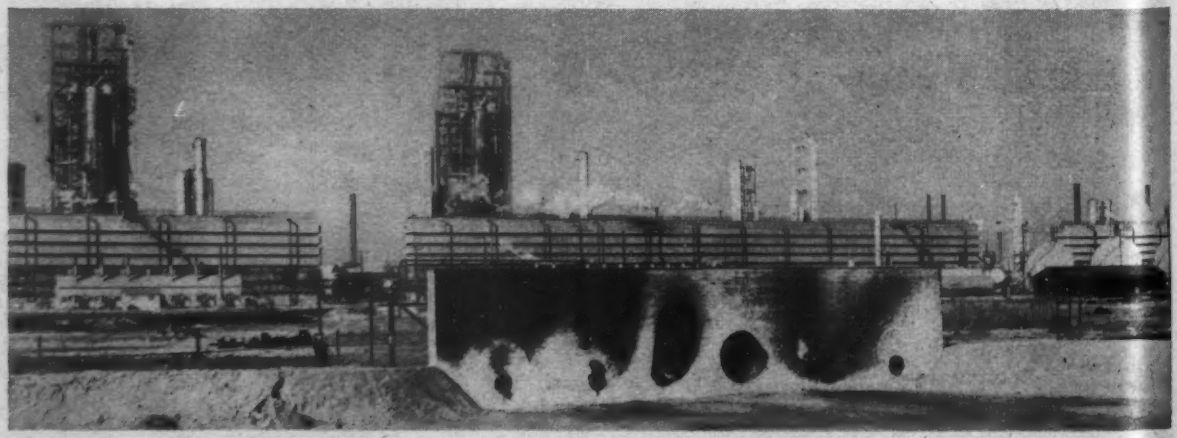


Pilot-controlled fully automatic regulating valves

As a first step a rather careful search of the literature was made but no reports of any approach to the problem were found. Without previous background, various methods of supplying and mixing air with the gas prior to ignition were studied with the result that the design of a venturi-type aspirating burner was attempted. Mechanical methods of aeration, for example by blowers, had to be ruled out because the volumes of gas to be handled were so great as to require equipment of prohibitive size. Information for the design of the experimental unit shown in Fig. 1 was obtained from three sources given in the bibliography and this unit was set up for field tests.

It was found that isobutane vapors could be burned without smoke using a ratio of venturi throat area to gas orifice area of 4 to 1. When isobutane containing considerable amounts, possibly 20 per cent of unvaporized material was fed to the burner it was necessary to substitute a smaller gas orifice thereby increasing this ratio to 16 to 1. With the 16 to 1 ratio the wet material burned without smoke, this despite the fact that liquid could be seen emerging from the burner mouth and entering the flame. Wet gas from the gas plant feed required a ratio of 8 to 1 for clean combustion. It was also determined that with the orifice ratio giving minimum satisfactory aeration the pressure upstream of the gas orifice could be reduced to ⅛ psig. without flame popping back. Below this limit operation was unstable; eventually the flame would travel back through the venturi tube and burn at the gas orifice; it was discovered, however, that a pressure of about 1 psig. would blow the flame through the tube and reestablish normal operation.

With the limitations of the venturi burner established, the application of such units to the refinery flare



View of concrete and brick wall and top of water seal (at lower left) as viewed from sump side

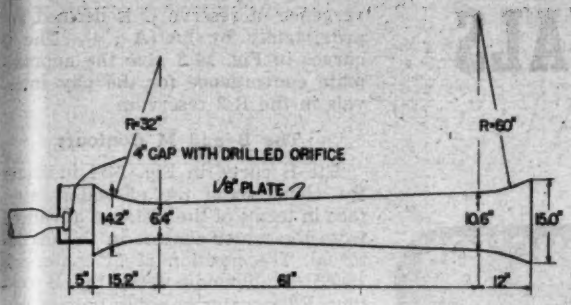


Fig. 1—Experimental burner

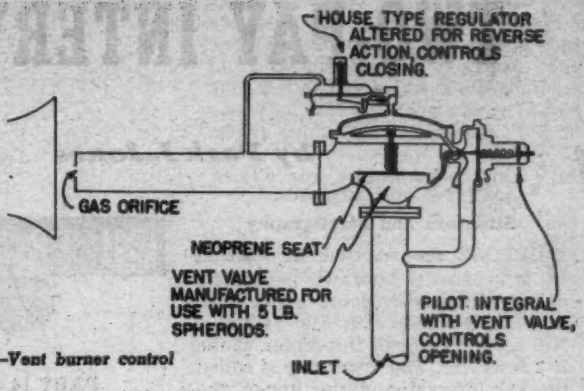

HOUSE TYPE REGULATOR ALTERED FOR REVERSE ACTION. CONTROLS CLOSING.
GAS ORIFICE
NEOPRENE SEAT
VENT VALVE MANUFACTURED FOR USE WITH 5 LB. SPHEROIDS.
PILOT INTEGRAL WITH VENT VALVE, CONTROLS OPENING.
INLET

Fig. 2—Vent burner control

system was considered. As it was apparent that the permissible pressure at the gas orifice would control the size of the equipment, calculations were made to determine the effect of this back pressure on the relief valve system, with the result that 5 psig. was chosen as the maximum figure. Because all the vessels tied into the burner system had design pressure of 100 psig. or over, and the relief piping was adequately sized, it was found that for any reasonable assumption of emergency conditions the pressure rise in the protected vessel or vessels would be well within the margin of allowance set by the A.P.I.-A.S.M.E. code. The effect of back pressure on the popping pressure of the relief valves could be ignored, as the greatest buildup at the downstream side of any valve was estimated at 15 psig. while the set pressure was at least 25 psig. below the design pressure of the vessel in question. It was also decided to design the burner installation for a rate of 14,000,000 cu. ft. per day, this seeming sufficient to handle any discharge resulting from emergencies.

Several Burners Employed

With an operating pressure range of ¼ to 4 psig., a given gas orifice would have a range of volume of 4 to 1. As the volume to be handled could be expected to vary from zero to the maximum it was decided to employ several burners of varying sizes with some sort of pressure responsive mechanism to cut them in successively. A conventional back-pressure control valve could not be used for this purpose for as soon as the burner was turned on the increased flow would drop the header pressure with the result that the valve would quickly shut off again, resulting in a cyclic intermittent action. To meet this problem an adaptation of commercially available control valves was made as shown in Fig. 2. With this mechanism adjustment, one pilot valve sets the opening of the main valve at any desired header pressure while the other pilot valve permits adjustment of the closing point to that pressure on the burner orifice which is the minimum for satisfactory operation.

A schedule of opening and closing pressures was set up for the series of burners, arranged so that the largest unit would be the last to cut in and the first to cut out. The size of the smallest burner orifice was next determined, being estimated from the surge capacity of the entire piping system and the normal amount of vapor leakage so that this burner would operate at fairly infrequent intervals to discharge accumulated material. The size of the next largest orifice was calculated from that of the smallest and the operating pressure schedule, being limited so that both burners at the cut-out pressure of the second would burn only as much gas as the first burner alone at the cut-in pressure of the second. It will be seen that this method of graduation provides a stable operating condition for any gas flow in the range covered, thereby avoiding intermittent operation. Other gas orifices were determined maintaining a similar relationship between the capacity of each additional burner and the total of those which would have previously cut in. Venturi-tube dimensions were established by direct proportion to the experimental unit which had given good results, selecting a venturi area to orifice area of about 8 to 1 as the most generally desirable. Sizes and pressures finally used after slight readjustments to conform to readily available material and after field tests together with other pertinent data are included in Table 1.

TABLE 1

Burner No.	Cut in (psi.)	Cut out (psi.)	Gas orifice dia. (in.)	Venturi throat dia. (in.)	Ratio throat area to orifice area
1	2¼	¼	1.61	5	9.6
2	2¾	½	2.9	8	7.8
3	3¼	¾	4.03	11.5	8.1
4	3¾	1	7.0	18	6.6

To convey the vapors to the battery of burners all vent lines were combined in a 36-in. diameter underground header, each burner having an individual riser to its control valve. Provision was made for continuous drainage of condensate, all vents were pitched from the relief valve to the header whence a sealed gravity drain conducted liquid to the refinery recovery system. Because lack of capacity or failure of the auto-

(Continued on page 134)

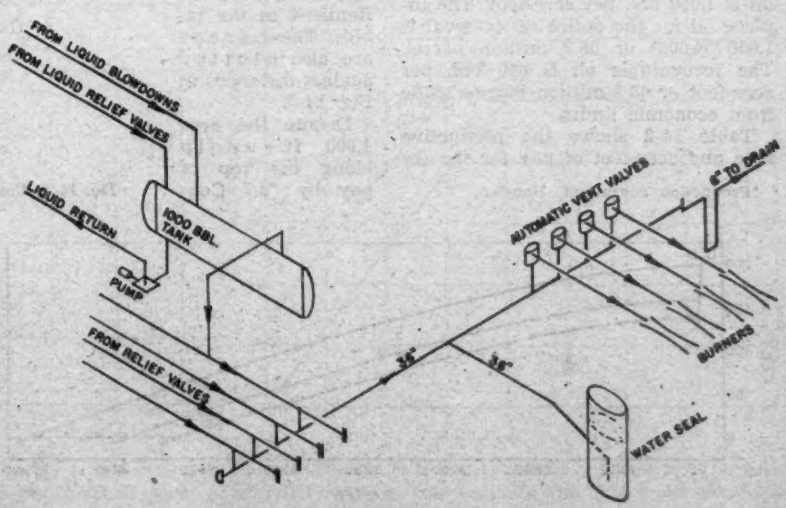


Fig. 3—Flow diagram of vent burner system

TWO-PAY INTERVALS

*by Park J. Jones**

OIL PRODUCTION by water

PART 14 OF A SERIES

THE characteristics of a radial reservoir having two pay intervals and the per-interval capacity to produce oil at MER by edge water are indicated. Control of per-interval producing rates will be considered in the next article.

Structure and Stratigraphy

SUPPOSE the reservoir of Part 12 is separated into two pay intervals by an impermeable break. Call this the R-2 reservoir. Fig. 14-1 is a N-S section through the center of the R-2 reservoir. The lower pay is called the (a) interval and the upper, the (b) interval.

Fig. 14-2 shows the structural contours on top of the (a) interval. These contours also represent the bottom of the (b) interval. Contours on top of the (b) interval are the same as those in Fig. 12-1. Contours on the bottom of the (a) interval are shown in Fig. 12-2.

For illustrative purposes, the water contact is at the same level in both intervals. However, reservoirs having two or more pay intervals usually have water contacts at different levels. The so-called tilted water table is a characteristic of reservoirs having two or more pay intervals. The (a) and (b) intervals of the R-2 reservoir may be interconnected somewhere on the downdip side of the water contacts. When wells are drilled, the two pays may be interconnected via well bores.

In-Place and Recoverable Oil

Table 14-1 gives the productive area and acre-feet of pay for the (a) interval. The productive area is 2,950 acres. There are 54,000 acre-feet of pay. Let the characteristics of the pay and properties of fluids be the same as those for the R-1 reservoir. The corresponding reservoir space is 1,164 bbl. per acre-foot. The in-place oil is 1,050 bbl. per acre-foot. The in-place oil for the entire (a) interval is 1,050 (54,000) or 56.7 million barrel. The recoverable oil is 800 bbl. per acre-foot or 43.2 million barrels aside from economic limits.

Table 14-2 shows the productive area and acre-feet of pay for the (b) interval. There are 4,020 acres and 139,300 acre-feet of pay. The in-place oil is 139,300 (1,050) or 146.3 million barrels. The recoverable oil is 800 bbl. per acre-foot or 111.4 million barrels for the entire (b) interval aside from economic limits. The ratio of the recoverable oil in the (b) interval to that in the (a) interval is 111.4/43.2 or 2.58.

*Production consultant, Houston.

Convergence of Reserve

The first two columns in Tables 14-1 and 14-2 give the relationship between elevation and distances from the respective water contacts along the top of the respective pays. Pass horizontal planes through the R-2 reservoir at various elevations. The productive areas A intercepted by the planes between top and bottom of the respective pays are itemized in the tables. These areas are also plotted against distances in Fig. 14-3.

Denote the area 1,000 ft. updip along the top of pay by "a." Convergence of reserve C is defined approximately by $2A/(A + a)$. The C curves in Fig. 14-3 give the approximate convergence for the pay intervals in the R-2 reservoir.

The B and M Contours

The B curve in Fig. 14-4 indicates the elevation of the oil-water interface in terms of the distance advanced from the water contact in the (a) interval. The position of M contour is 1,000C ft. downdip from the B contour. Edge water becomes bottom water when the M contour reaches the 140-ft. elevation. The elevation of the B contour is about 155 ft. when the M contour is at the 140-ft. level.

The B curve in Fig. 14-5 indicates the elevation of the oil-water interface in terms of the distance advanced from the water contact in the (b) interval. The position of the M contour is 1,000C ft. downdip from the B contour. Edge water becomes bottom water when the M contour reaches the 160-ft. elevation. The elevation of the B contour is about 178 ft. when the M contour is at the 160-ft. level. The data are relative to no production of water from the B-M region. Production of water decreases the difference in elevation between the B and M contours.

TABLE 14-1—PRODUCTIVE AREA AND ACRE-FEET, (a) INTERVAL

Elevation	Feet	Productive acres			Thousand acre feet	
		Top	Bottom	A	ah	Σah
.. ..	....	2,950	2,450	500	....	....
20 ..	790	2,450	1,970	480	9.80	9.80
40 ..	1,650	1,970	1,540	430	9.10	18.90
60 ..	2,510	1,540	1,130	410	8.40	27.30
80 ..	3,430	1,130	790	340	7.56	34.86
100 ..	4,350	790	475	315	6.55	41.35
120 ..	5,310	475	204	271	5.86	48.21
140 ..	6,660	204	....	204	4.75	51.96
160 ..	9,040	....	....	....	2.04	54.00

Average pay thickness = 54,000/2,950 = 18.3 ft.

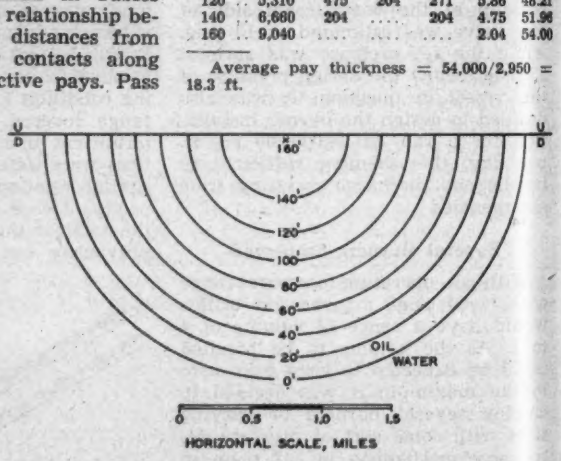


Fig. 14-2—Contours on top of (a) interval in R-2 reservoir

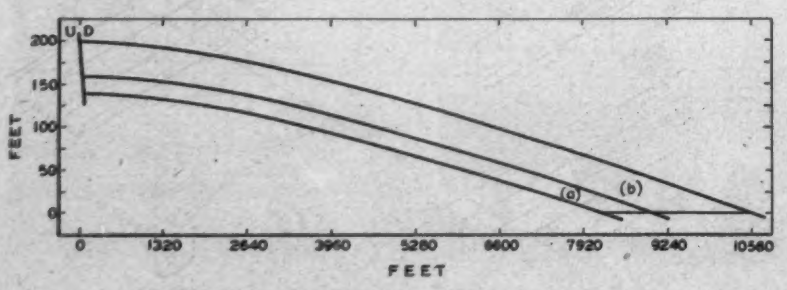


Fig. 14-1—N-S section through the center of the R-2 reservoir

Invaded Acre-Feet

The last column in Tables 14-1 and 14-2 gives the acre-feet of pay in terms of the distance from water contact along the top of the respective pay intervals. These data are indi-

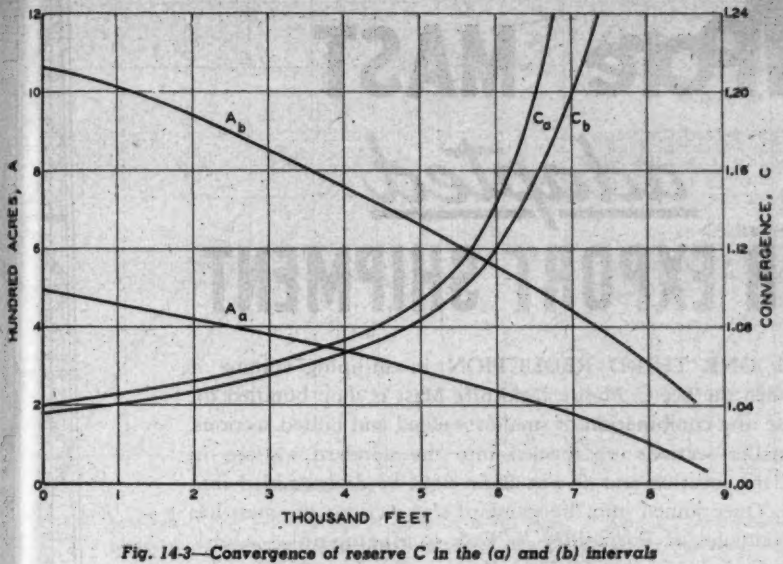


Fig. 14-3—Convergence of reserve C in the (a) and (b) intervals of the R-2 reservoir; A is productive area in horizontal planes

cated by the B curves in Figs. 14-6 and 14-7. The M curves in Figs. 14-4 and 14-5 show the lag of the M contours behind their B contours. The acre-feet of pay below the B contours corrected for lag gives the acre-feet of pay below the M contours.

TABLE 14-2—PRODUCTIVE AREA AND ACRE-FEET, (b) INTERVAL

Elevation	Feet	Productive acres			Thousand acre feet	
		Top	Bottom	A	ah	Σah
....	....	4,020	2,950	1,070	....	....
20	730	3,480	2,450	1,030	21.00	21.00
40	1,520	2,950	1,970	980	20.10	41.10
60	2,310	2,450	1,540	910	18.90	60.00
80	3,170	1,970	1,130	840	17.50	77.50
100	4,030	1,540	790	750	15.90	93.04
120	4,950	1,130	475	655	14.05	107.45
140	5,870	790	204	586	12.41	119.86
160	6,930	475	....	475	10.61	130.47
180	8,280	240	....	204	6.79	137.26
200	10,560	....	....	....	2.04	139.30

Average pay thickness = 139,300/4,020 = 34.7 ft.

TABLE 14-3—CUMULATIVE OIL RECOVERY FROM THE (a) INTERVAL

Thousand feet for B	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.9
Thousand acre-feet for B	6.2	11.8	17.3	22.2	27.0	31.2	35.2	38.9	42.2	45.3	48.0	50.0	51.6	53.6
Thousand acre-feet for M			5.6	11.4	16.6	21.8	26.3	30.8	34.7	38.3	41.7	44.6	47.2	52.0
Thousand acre-feet for (B—M)	6.2	11.8	11.7	10.8	10.4	9.4	8.9	8.1	7.5	7.0	6.3	5.4	4.4	1.6
Million barrels from (B—M)*	2.3	6.3	6.2	5.7	5.5	5.0	4.7	4.3	4.0	3.7	3.3	2.9	2.3	0.8
Million barrels for M†			4.5	9.1	13.3	17.4	21.0	24.6	27.7	30.6	33.4	35.7	37.8	41.6
Cumulative recovery, million barrels	2.3	6.3	10.7	14.8	18.8	22.4	25.7	28.9	31.7	34.3	36.7	38.6	40.1	42.4

*At 530 bbl. per acre-foot except the first one at 370. †At 800 bbl. per acre-foot.

TABLE 14-4—CUMULATIVE OIL RECOVERY FROM THE (b) INTERVAL

Thousand feet for B	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.1
Thousand acre-feet for B	14.5	28.0	41.0	52.5	63.5	74.0	83.5	92.5	100.5	108.0	115.0	121.0	130.5	137.0
Thousand acre-feet for M			13.0	27.0	39.5	51.5	62.5	72.5	82.5	91.0	99.0	106.5	120.0	130.5
Thousand acre-feet for (B—M)	14.5	28.0	28.0	25.5	24.0	22.5	21.0	20.0	18.0	17.0	16.0	14.5	10.5	6.5
Million barrels from (B—M)*	5.4	14.8	14.8	13.5	12.7	11.9	11.1	10.6	9.5	9.0	8.5	7.7	5.6	3.4
Million barrels for M†			10.4	21.6	31.6	41.2	50.0	58.0	66.0	72.8	79.2	85.2	96.0	104.4
Cumulative recovery, million barrels	5.4	14.8	25.2	35.1	44.3	53.1	61.1	68.6	75.5	81.8	87.7	92.9	101.6	107.8

*At 530 bbl. per acre-foot except the first point at 370. †At 800 bbl. per acre-foot.

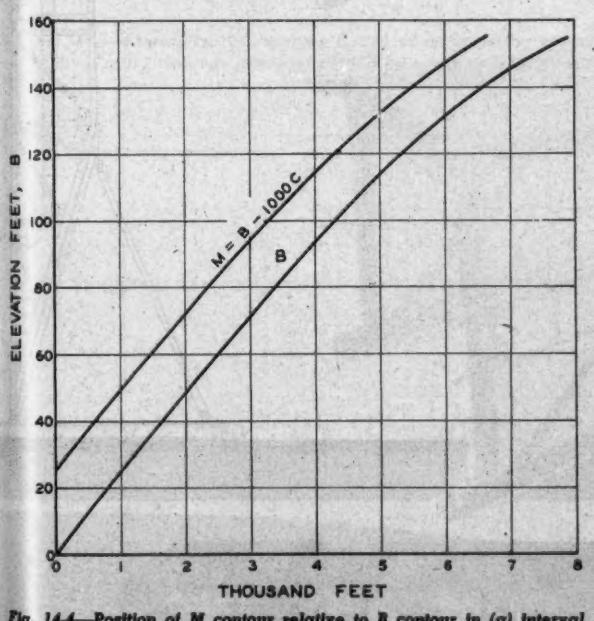


Fig. 14-4—Position of M contour relative to B contour in (a) interval of the R-2 reservoir; drop vertically from M to B and obtain elevation of M contour

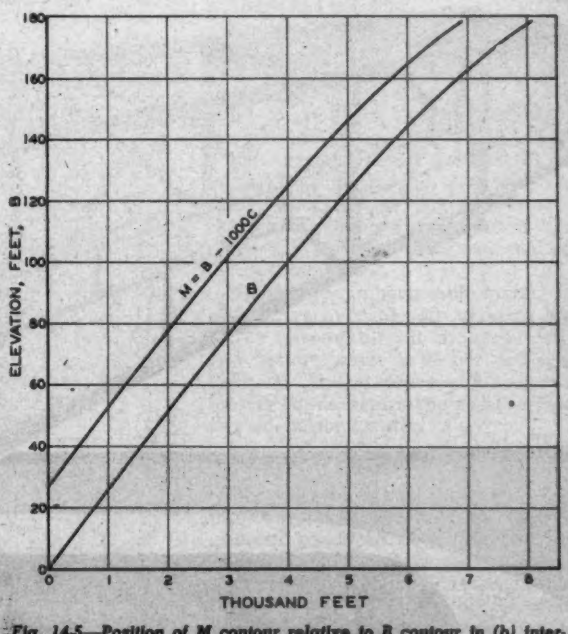
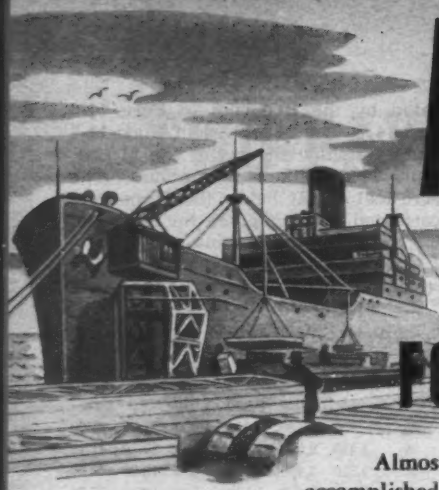


Fig. 14-5—Position of M contour relative to B contour in (b) interval of R-2 reservoir; drop vertically from M to B and obtain elevation of M contour



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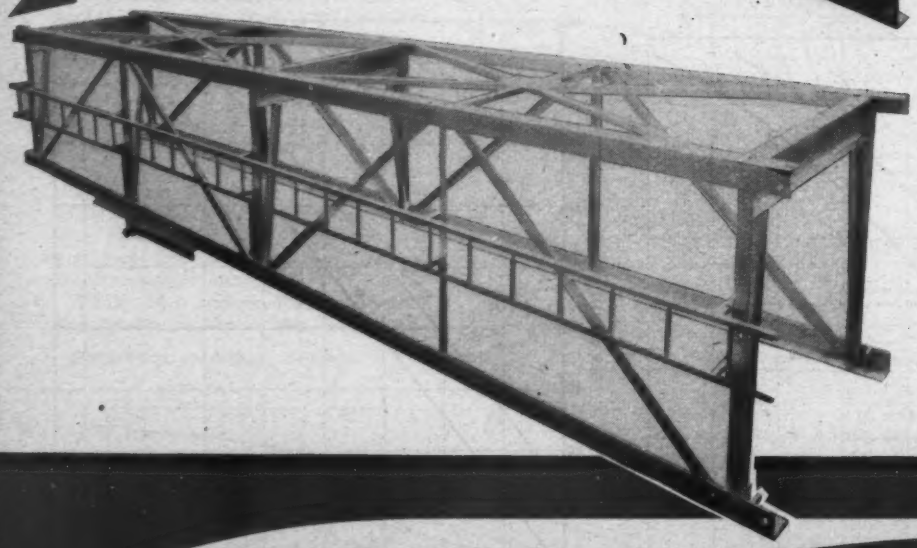

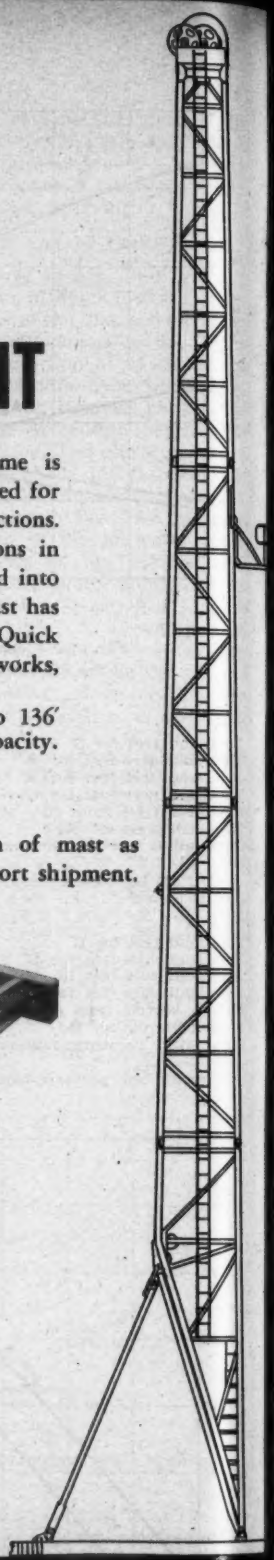

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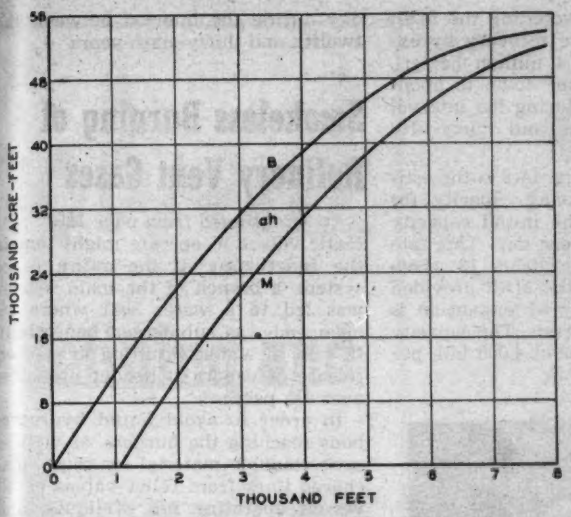

Fig. 14-6—Acre-feet of pay below B and M contours in (a) interval of R-2 reservoir vs. distance advanced along top of pay by B contour

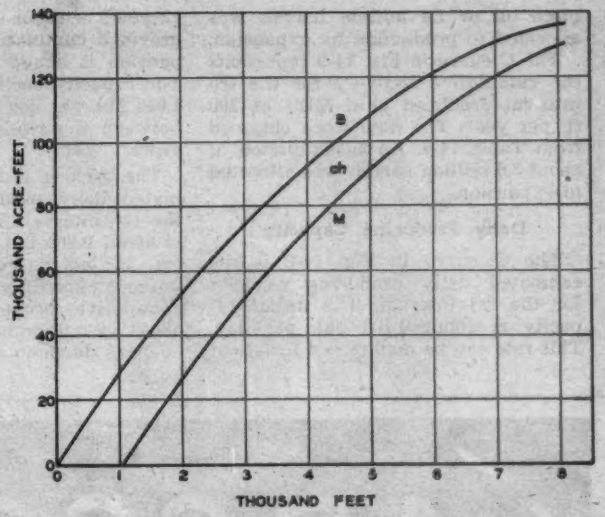

Fig. 14-7—Acre-feet of pay below B and M contours in (b) interval of R-2 reservoir vs. distance advanced along top of pay by B contour

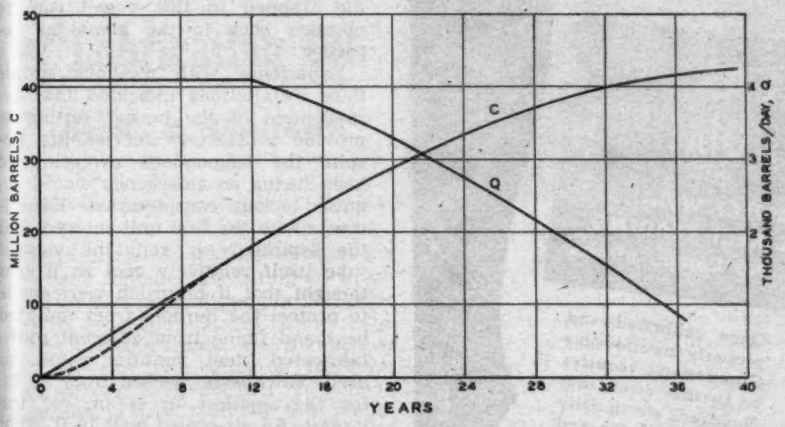

Fig. 14-8—Cumulative oil recovery C and daily producing capacity Q vs. time for (a) interval of R-2 reservoir produced at MER by water and 1.4 million barrels by expansion

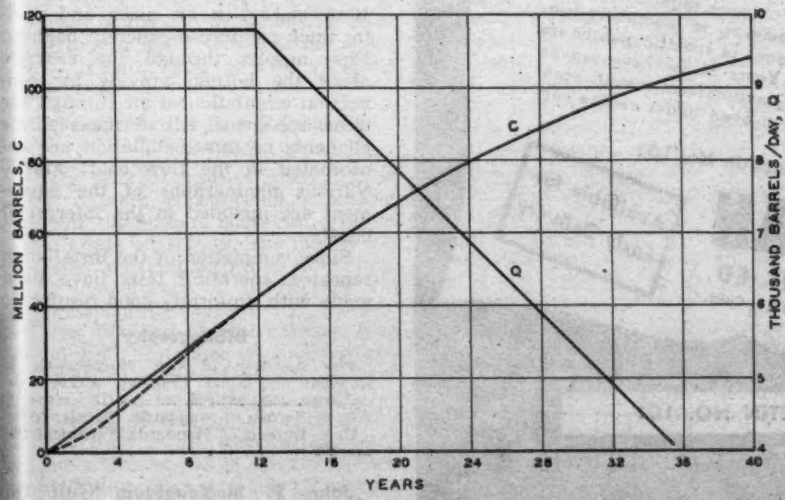

Fig. 14-9—Cumulative oil recovery C and daily producing capacity Q vs. time for (b) interval of R-2 reservoir produced at MER by water and 3.6 million barrels by expansion

Cumulative Oil Recovery

The procedure used to estimate cumulative recovery is itemized in Tables 14-3 and 14-4. For the oil-water interface at 500 ft. from the oil-water contacts a displacement factor of 370 bbl. per acre-foot was used. All other acre-feet within the B-M regions were run at 530 bbl. per acre-foot. The displacement factor for the acre-feet below the M contours is 800 bbl. per acre-foot.

The estimated reserve for encroaching, or injected, edge water is 42.4 million barrels for the (a) interval and 107.8 million barrels for the (b) interval. The ratio of these reserves is 107.8/42.4 or 2.54.

The recoverable oil for the (a) interval is 43.2 million barrels. The ratio 42.4/43.2 or 98 per cent is recoverable oil for edge water. The other 2 per cent is recoverable oil for bottom water.

The recoverable oil for the (b) interval is 111.4 million barrels. The ratio 107.8/111.4 or 96.8 per cent is recoverable oil for edge water. The other 3.2 per cent is recoverable oil for bottom water.

Without the impermeable break, the ratio of recoverable oil by edge water to recoverable oil by edge water and bottom water is 94 per cent (see Part 12). The presence of impermeable breaks decreases the reserve relative to bottom water.

Cumulative Recovery and Time

The C curve in Fig. 14-8 represents the cumulative recovery for the (a) interval produced at a MER of 200 ft. per year. The data were obtained from Table 14-3. The dashed portion of the C curve is for displacement by water. The solid curve is for oil production by displacement and expansion. About 2.5 per cent of in-

place oil or 1.4 million barrels was allocated to production by expansion.

The C curve in Fig. 14-9 represents the cumulative recovery for the (b) interval produced at a MER of 200 ft. per year. The data were obtained from Table 14-4. An accumulation of about 3.6 million barrels was allocated to expansion.

Daily Producing Capacity

The Q curve in Fig. 14-8 is the estimated daily producing capacity for the (a) interval. The initial capacity is about 4,100 bbl. per day. This rate can be maintained for about 12 years without exceeding the MER provided cumulative recovery by expansion is about 1.4 million barrels. The capacity declines down to about 1,000 bbl. per day during the interval between the twelfth and thirty-fifth years.

The Q curve in Fig. 14-9 is the estimated daily producing capacity for the (b) interval. The initial capacity is about 9,800 bbl. per day. This rate can be maintained about 12 years without exceeding the MER provided cumulative recovery by expansion is about 3.6 million barrels. The capacity declines down to about 4,000 bbl. per day during the interval between the twelfth and thirty-sixth years.

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Smokeless Burning of Refinery Vent Gases

(Continued from page 129)

matic valves to operate might impair the functioning of the entire relief system, a branch of the main header was led to a water seal where its open end was submerged beneath 10 ft. 4 in. of water, resulting in assured release of vapors at header pressures over 4½ psig.

In order to avoid liquid hydrocarbons reaching the burners, as well as save valuable material for reuse, discharge lines from relief valves of all vessels operating full of liquid, and hand controlled drains from reflux drums and the like were segregated and led to a 10-ft. diameter by 78-ft. long accumulator which in turn was connected to the burner header. Liquid trapped in this vessel can be pumped back to the plant for recovery.

Experience with previous simple flare installations indicated that arrangement of the burner setting to provide satisfactory service life despite the tremendous evolution of heat during an emergency would require serious consideration. Experiments with the first unit showed that the aspirated air kept the venturi tube itself relatively cool so it was thought that if provision were made to protect the burners from radiated heat and flame from adjacent units, fabricated steel venturis could be used. Thicknesses varied from ¼ in. for the smallest to ½ in. for the largest. An air-cooled wall 10 ft. high and 50 ft. long was constructed and the burners were installed flush with the surface through suitable ports. The well consists of a 13-in. face of firebrick, a 2-in. air space, and an 8-in. thick reinforced-concrete backing. Pipe nipples through the concrete along the bottom provide for convection circulation of air through the clearance space. All of the separate elements of this installation are coordinated in the flow chart Fig. 3. Various photographs of the equipment are included in the interest of clarity.

Since completion of the installation repeated operating tests have been made with uniformly good results.

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John P. McNaughton, Gulf Oil Corp. engineer at Chase, Kans., has been transferred to Seminole, Okla.

Solvent Refining and Dewaxing of Lubricating Oil

by W. E. Skelton *

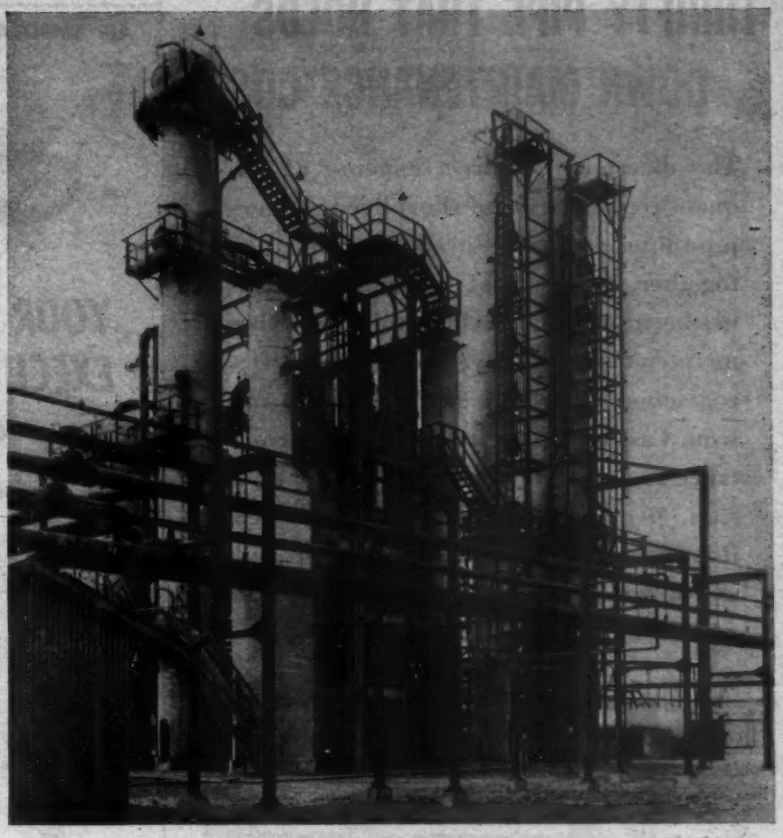

Fig. 1—General view of a furfural refining unit, showing treater tower, solvent-recovery towers, and solvent-dehydrating system

THE crude oil as obtained from the well contains lubricating oil which has to be separated and purified prior to its use. Crude oil distillation is the first step and results in a segregation of the raw lubricating-oil fractions. These raw fractions may be solvent refined to free them of low-quality components which are potential sludge and carbon formers and which also have poor viscosity-temperature characteristics. If the solvent refined fraction still contains wax it may be removed in the solvent dewaxing process to provide a wax-free oil which will remain fluid at low operating temperatures.

Preparation of Raw Lubricating Fractions

The selected crude oil as received at the refinery is subjected to a fractional distillation operation wherein the crude oil is split into the various desired portions according to the boiling temperature of the portion. The lowest boiling portion, and the first to be distilled, is the gasoline fraction while the other products in their respective order of removal are kerosene, diesel fuel, gas oil and the lubricating oil fractions. The light fractions such as the gasoline and kerosene are removed in an atmospheric distillation stage but the lubricating-oil fractions are obtained by distillation under vacuum which permits vaporization to take place at temperatures sufficiently low that decomposition by cracking does not occur.

The distillation operation requires accurate and skillful control to assure that the proper grade of raw lubricating-oil fractions are obtained. The operation of the vacuum still is maintained to provide fractions conforming to a limited range of variation for such tests as gravity, flash, fire, viscosity, and others in order that after solvent refining and solvent dewaxing, the finished oils will conform to rigid specification values for the above-named tests as well as other quality tests as viscosity index, pour test, carbon residue, neutralization number, demulsibility, and numerous others which are criteria for the service of the lubricant in its intended final application and usage.

The lubricating-oil fractions as obtained from the crude-oil distillation unit are not suitable as quality lubricants and they contain poor-quality components which vary widely in viscosity with changes in temperature as well as causing sludge and carbon formation when used at fairly high operating temperatures. The fractions also may contain wax which causes solidification to occur at temperatures as high as 100° F. It is therefore obvious that these undesirable components of the raw lubricating-oil fractions must be removed in order to produce a finished oil which will function as a lubricant in an entirely satisfactory manner.

Solvent Refining

Several processes employing various solvents have been used for the purification by solvent refining of the raw lubricating-oil fractions from the crude-distillation unit. One of the most widely used of these processes is the furfural refining process. In this process, furfural is used as the selective solvent to remove the undesirable components contained in the raw lubricating oil fraction.

Furfural is a chemical compound which is obtained commercially by digesting agricultural wastes such as oat hulls, straw, corn cobs, rice hulls, etc., with dilute sulfuric acid. The crude product from this digesting operation is purified by means of distillation. The purified product is essentially 100 per cent furfural which has the following physical properties:

Boiling point, °F.	323
Freezing point, °F.	—34
Specific gravity at 68° F.	1.1623
Viscosity at 100° F., Saybolt Univ. sec.	39.7

*Beacon research laboratory, technical and research division, The Texas Co., New York.

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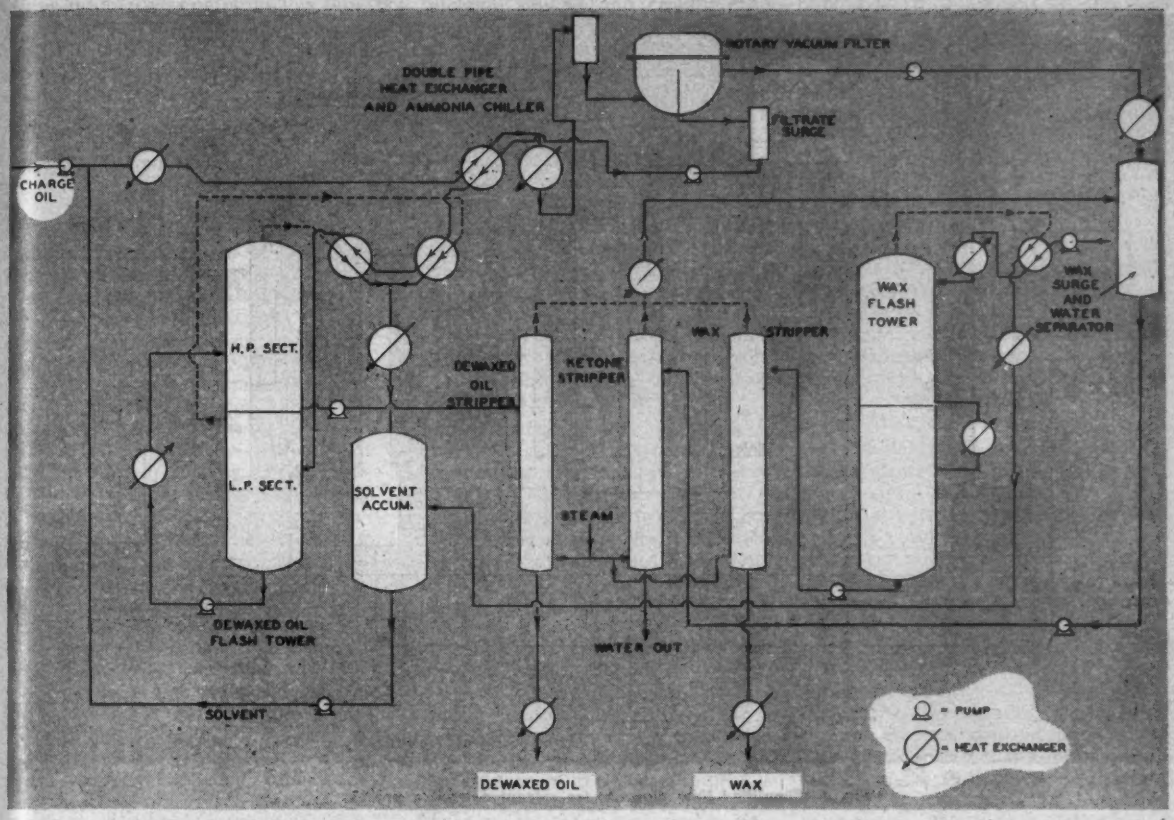


Fig. 2—Simplified flow diagram for furfural refining process

Specific heat (68°-122° F.)	0.416
Heat of vaporization, B.t.u. per lb.	193.5
Vapor pressure at 100° F., mm. Hg.	10
Flash point (Tag. closed cup), °F.	138
Solubility in water, per cent	5.8

Operation of Furfural Refining Process

Furfural possesses the property of selective solvent action which results in solution of the undesirable constituents of the raw lubricating-oil fraction in the furfural solvent while the high quality oil components remain undissolved. There are two liquid phases formed when the raw lubricating oil and furfural are mixed and because of the high specific gravity of furfural as compared with oil, a separation of the phases is readily effected.

The lighter phase is called the raffinate solution and consists of approximately 90 per cent refined oil and 10 per cent furfural while the heavier phase consists of approximately 90 per cent furfural and 10 per cent undesirable oil components. This heavier phase is known as the extract solution. The temperature of the refining operation is controlled to remove the low quality components of the raw lubricating oil and the yield of refined oil varies with crude source. Some raw lubricating oil fractions contain a greater percentage of low quality constituents than others and higher extraction temperatures are necessary to remove the larger quantities of such undesirable components.

The solvent refining operation is illustrated in flow diagram shown as Fig. 2. In commercial practice, the solvent-refining or extraction operation is usually carried out in a packed tower. Raschig-ring packing is used to provide a large amount of surface in order to attain the desired extraction of the low-quality components from the raw lubricating-oil fraction by the furfural.

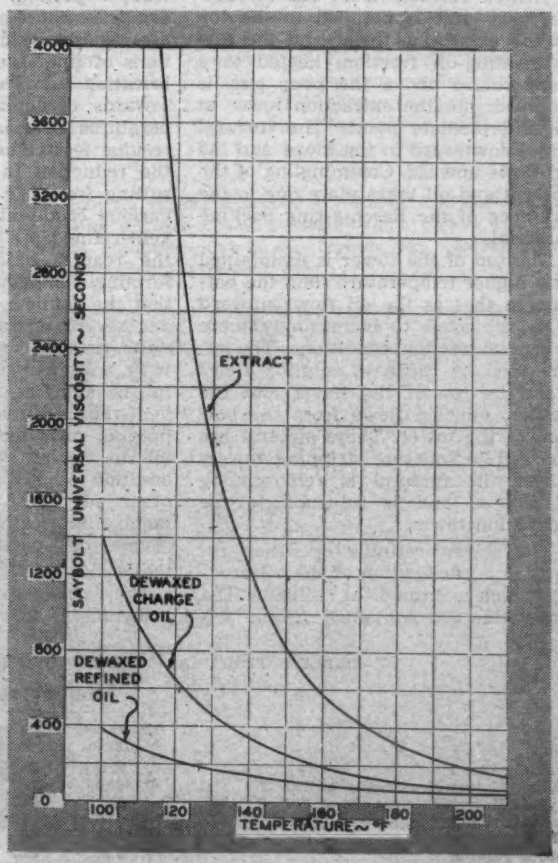


Fig. 3—Chart showing effect of furfural refining upon the viscosity-temperature relationship. Note that viscosity does not vary greatly with temperature changes

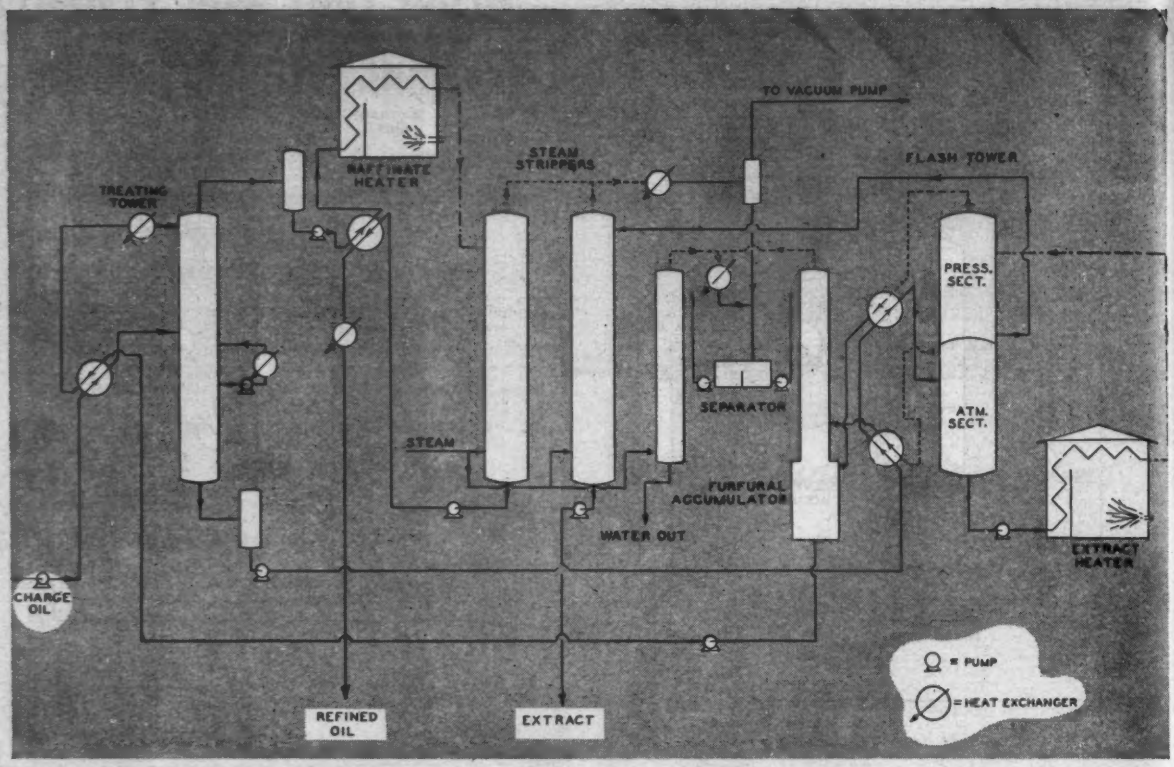


Fig. 4—Simplified flow diagram for solvent dewaxing process

Heated furfural from the solvent-recovery unit is pumped to the top of the extraction tower and the raw lubricating-oil fraction, heated to a temperature above the pour test, is pumped into the extraction tower at an intermediate point. The furfural flows downward in the tower and the oil flows upward. Commingling of the solvent and oil takes place due to the presence of the Raschig-ring packing material.

The top of the tower is maintained at a higher temperature than the bottom so that as the oil flows upward it is subjected to increasingly more severe extraction conditions. The refined oil or raffinate solution flows from the top of the tower and the extract solution flows from the bottom of the tower. These streams are charged to separate stripping towers where the furfural is removed by distillation and is returned to the extraction tower.

The solvent-refining operation results in a purification of the oil product which is termed the raffinate. The impurities are contained in the extracted portion. This latter portion comprises those oil components which are readily oxidizable under conditions of final use of the finished lubricating oil. The relative tendency towards carbonization at high temperatures is measured by the carbon residue test value. Table 1 illustrates the reduction in carbon residue resulting from the furfural refining of various crude-oil fractions. The solvent-refined oil therefore is freed of the readily oxidizable and sludge-forming components with the result that the refined oil may be used under severe operating conditions and will provide superior lubrication with a higher degree of cleanliness in the lubrication system. The solvent-refining process also provides a product oil which is more susceptible to further improvement by the addition of oxidation inhibitors and other additives which permit satisfactory lubrication under extremely severe or special operating conditions.

The extract portion of the raw lubricating-oil fraction also has a low viscosity index. The viscosity index is an inverse expression of the relative rate of change in viscosity with change in temperature. Thus the extracted material becomes extremely viscous when it is cooled to temperatures of the order common in the winter season. The extract also contains those compounds removed from the raw lubricating oil fraction which would oxidize and carbonize readily at temperatures in the order of those existent for instance in an internal combustion engine.

The effect of furfural refining upon the viscosity-temperature relationship is illustrated graphically by Fig. 3. It will be seen that furfural refining has resulted in a refined oil whose viscosity does not vary greatly as the temperature changes. This is of importance since the oil does not become as thin or nonviscous at high operating temperatures and also does not thicken or become as excessively viscous at low operating temperatures. As an illustration of this, a motor oil that has been properly solvent refined will permit easy starting

TABLE 1—FURFURAL REFINING OF FRACTIONS FROM MID-CONTINENT CRUDE

	Medium distillate			Heavy distillate			Deasphalted short residuum		
	Dewaxed charge	Dewaxed raffinate	Extract	Dewaxed charge	Dewaxed raffinate	Extract	Dewaxed charge	Dewaxed raffinate	Extract
Gravity, °A.P.I.	22.6	29.5	11.1	20.9	28.9	12.0	19.7	26.3	14.2
Saybolt Universal viscosity at 100° F.	480.5	249.3	....	1614	567.9	....	9358	2929	....
Saybolt Universal viscosity at 210° F.	55.3	49.3	88.1	89.7	64.5	186.7	254	161.8	387
Viscosity index	52.3	96.9	....	43.5	96.3	....	63.4	92.8	....
N.P.A. color	8	3½	....	8+	3+	....	....	....	....
Carbon residue	0.28	0.02	....	1.05	0.02	....	2.4	0.44	....

of the automotive engine at low winter temperatures and will also continue to provide proper lubrication after the engine has attained the operating temperature.

Solvent Dewaxing

In many instances where paraffinic-type crudes are involved, the resulting solvent-refined oils contain sufficient wax to make them unsuitable for use over the range of temperature encountered in the intended service. When the wax contained in the undewaxed refined oil crystallizes upon cooling the oil, the crystals form a network or matrix which holds the oil and the mass becomes solid or semisolid. Under this condition the oil will not flow or be moved by gravitational forces. Although it may be forced to flow by application of very high pressure, the waxy oil will not spread over a metal surface to be lubricated. Furthermore, the semisolid character of the waxy oil at winter temperature would necessitate the development of an extremely high torque for the starting of an automotive engine for instance. Aside from the fact that the wax solidifies in oil at temperatures below 100° F., it also has the disadvantage of having a low viscosity at the high operating temperatures and does not provide good lubrication. For these reasons wax must be removed to provide a finished lubricating oil of good quality which will flow freely at low temperatures.

Of the various processes which have been employed for this purpose such as cold settling, cold pressing (filtration without diluent), centrifuging of naphtha diluted and chilled oil, and filtration after dilution with a selective solvent and chilling, the last-named has been found most satisfactory and is now enjoying widespread use in the petroleum industry.

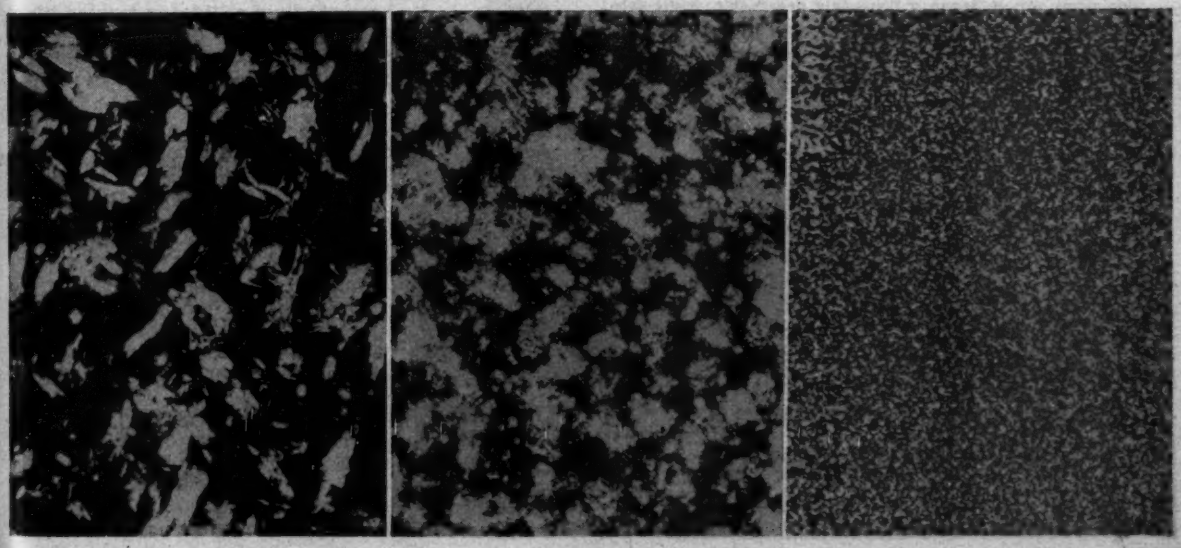
The solvent most generally used in the solvent dewaxing process is a mixture of methyl ethyl ketone and benzol. The ratio of the ketone to benzol is adjusted to prevent any separation of liquid oil when the solution is chilled to the filtering temperature. With the use of the proper solvent and when suitable chilling rates are employed, the wax is separated in crystals with a minimum occlusion of oil and in form which permits their being separated from the oil-solvent mixture by filtration at high rates of filter throughput.

The flow for solvent dewaxing is shown in Fig. 4. In a typical operation, the waxy refined oil is mixed with the solvent in the correct proportion at a temperature of about 120° F., at which temperature the oil and wax are dissolved in the solvent. The solution passes through double-pipe heat exchangers where some refrigeration is recovered from the cold filtrate solution from the rotary vacuum filter. The solution is further chilled by direct expansion of ammonia in double-pipe chillers which are equipped with scrapers to prevent the accumulation of solid wax on the inner surface of the center pipes.

The chilled solution containing the solidified wax flows from the double-pipe chiller to the rotary vacuum filter. The drum of the filter rotates and the level of the solvent-oil-wax mixture is such that about one-half of the drum is submerged. Filtration occurs on the portion of the drum which is submerged and as this portion approaches the top in its rotation, a wash is applied on the wax cake by spraying with chilled solvent. In the further rotation, the cake is dried by the inert gas (contains substantially no oxygen) pulled through the wax cake by the vacuum existing inside the drum. Following this, a slight positive gas pressure is applied as the wax cake approaches the scraper blade which causes the wax to fall into a screw conveyor which discharges the slack wax from the filter to the slack wax surge tank. From this tank the wax is pumped to the wax flash tower where the major part of the solvent is removed by distillation. Removal of the final traces of solvent is accomplished by steam stripping in the wax stripper tower. The stripped wax is cooled and pumped to storage.

The dewaxed filtrate flows from the vacuum filter into the filtrate surge tank from which it is pumped through the double-pipe heat exchangers, where refrigeration is recovered, and then through low pressure and high pressure vapor heat exchangers. Sufficient heat is absorbed by the filtrate solution in the exchange equipment to cause a considerable quantity of the solvent to be vaporized in the low-pressure section of the dewaxed-oil flash tower. The bottoms from the low-pressure section of the flash tower are pumped through a heater to the high-pressure section. The heat from the vapors of this section is used, by means of the exchange equipment, to cause vaporization of solvent in the low-pressure section. The bottoms from the high-pressure section are freed of the final traces of solvent by open stream stripping in the dewaxed oil stripper. The steam stripped dewaxed oil is

Fig. 5—Photomicrographs of wax crystals show that the sizes of crystals vary greatly for various lubricating-oil fractions. Left: Photomicrograph of wax crystals from light lubricating distillate in methyl ethyl ketone-benzol solution. Center: Photomicrograph of wax crystals from heavy lubricating-oil distillate in methyl ethyl. Right: Ketone-benzol solution. Photomicrograph of wax crystals from residual lubricating oil in methyl ethyl ketone-benzol solution. Magnification 75X in each case



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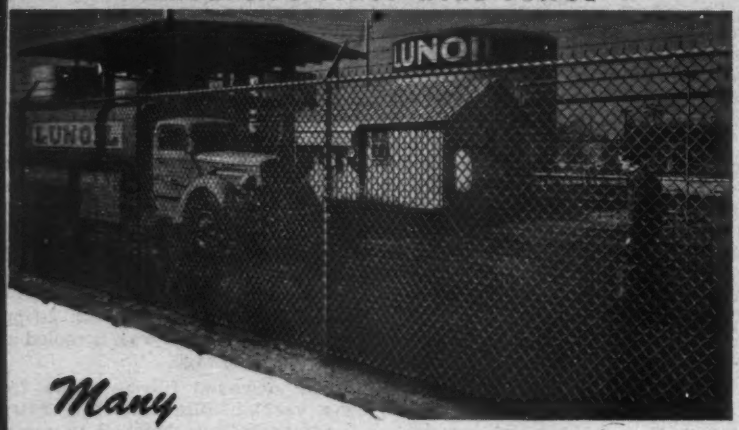

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then pumped through a cooler to oil storage.

The wax contained in the refined oil varies widely with the character and viscosity grade of the oil fraction as illustrated by the photomicrographs of Fig. 5. The light or low-viscosity distillate fractions contain wax which crystallizes in large plate or needle shapes and with increasing viscosity grades the wax crystals become smaller. The refined residual stocks contain microcrystalline wax, the crystals of which are very small. The solvent dewaxing process is sufficiently flexible to allow good operation despite the variation in the size and character of the wax crystals.

The wax removed from the light distillate refined oil is markedly crystalline in character and, when a slab is subjected to bending to the breaking point, shows crystalline appearance on the broken edges. The wax or petrolatum removed from the refined residual stock when distorted by bending shows a certain degree of plasticity and will therefore bend to a considerable extent before breaking.

Summary

1. The solvent-refining process produces a refined oil which has been freed of components susceptible to oxidation, sludge formation, and carbon deposition.

2. The solvent-refined oil is very amenable to further improvement by the use of oxidation inhibitors and other additives.

3. Solvent refining improves viscosity index and therefore the oil does not become as extremely viscous at low temperatures and also does not become as thin at the higher operating temperatures.

4. The wax contained in lubricating oil fractions must be removed to provide a finished oil which will flow readily at low temperatures.

5. The solvent dewaxing process provides a dewaxed oil which will remain fluid at the low temperatures.

6. The solvent dewaxing process is flexible in operation and is applicable to a wide variety of lubricating oil stocks.

Electric Utility Fuel-Oil Use Reaches New Record

WASHINGTON.—Reflecting the effect of the coal strike, fuel-oil consumption in electric-utility power plants climbed from 4,371,639 bbl. in November, a daily average of 145,721 bbl., to a new record of 5,298,426 bbl. in December, a daily average of 170,917 bbl.

The December consumption was more than double that of December 1945, when electric utility companies used a total of 2,569,611 bbl., a daily average of 82,891 bbl., the Federal Power Commission reported.

Larger Drill Pipe Results in Greater Speed In Drilling Gulf Coast Wells

by E. H. Short, Jr.

ONE of the most recent contributions toward the faster drilling of Gulf Coast wells is Humble Oil & Refining Co.'s engineering work in connection with the use of larger-size drill pipe as a means of obtaining greater circulating rates. This work was begun by Humble over 3 years ago, and data assembled on several rigs where 4½-in. o.d. drill pipe had been replaced with 5-in. o.d. drill pipe having a wall thickness of 0.362 in. served as a basis for its recent standardization on this size of drill pipe. At the present time Humble has five strings of 5-in. drill pipe in operation, and company engineers predict that this size pipe will gradually replace the 4½-in. pipe on all company-operated extra-heavy rigs.

During the past few years the need for greater circulation rates brought about by deeper drilling has been met to some extent by design of drill-pipe upset and tool joints to offer a minimum amount of restriction to the passage of drilling fluid. The improvement of design, however, as a means of increasing circulation rates appears to have been fully exploited, and to keep pace with the economic demand for faster drilling of deep wells with a minimum amount of trouble due to stuck pipe, Humble made an investigation of the larger pipe.

Fig. 1 is a curve showing relation between rate of circulation (g.p.m.) and pump hydraulic horsepower based on drilling operations of a Humble rig equipped with 4½-in. o.d. drill pipe fitted with I.F. tool joints. The tremendous increase in horsepower which would be required to maintain 600-g.p.m. rate of circulation is brought out in the curve. At 5,000 ft., with a circulation rate of 600 g.p.m. the fluid and horsepower requirement amounts to 280. When the depth has approximately doubled, or reached 10,990 ft., the horsepower requirement advances to 625. With the same mud conditions as involved in Fig. 1, Fig. 1-A shows the circulating pressures required to maintain various rates of circulation at different drilling depths.

Fig. 1 was based on a drilling condition involving 10.3-lb.-per-gal. mud with a viscosity of 41 seconds A.P.I. Fig. 2 shows the fluid-end horsepower requirement with 4½-in. drill pipe using 16.4-lb. mud with a viscosity at 44-41 seconds A.P.I. At 11,000 ft. under these conditions a gain in circulation rate of only 25 g.p.m. would be realized if the fluid-end horsepower were increased from 500 to 600.

Fig. 2-A, based on the same mud conditions as Fig. 2, shows the tremendous increases in pressures which would be involved if high rates of circulation were maintained with heavy mud at deep depths.

The pressure drop in pounds per square inch per 1,000 ft. of pipe at various rates of circulation for 5-in. o.d. drill pipe with 4½-in. I.F. tool joints, and 4½-in. E.U.I.F. drill pipe with I.F. tool joints is shown in Fig. 3. Arbitrarily selecting a circulation rate of 900 g.p.m. it will be found that the pressure drop amounts to 260 psi. per 1,000 ft. and the 4½-in. and only 160 psi. per 1,000 ft. for the 5-in. A 38 per cent reduction in drill-pipe pressure loss is effected through the use of the larger-size pipe. With the same pressure drop in both sizes, of 160 psi. per 1,000 ft., the increase in circulation rate of the 5-in. over the 4½-in. amounts to 200 g.p.m., or over 28 per cent.

Horsepower Requirements

Fig. 4 shows a comparison between the hydraulic horsepower requirements for the two sizes of drill pipe. At a circulation rate of 900 g.p.m., the use of 5-in. o.d. pipe effects a reduction of hydraulic horsepower of 40 per cent over that required by 4½-in. pipe.

The 5-in. o.d. drill pipe being used by Humble was recommended for adoption as a tentative standard size

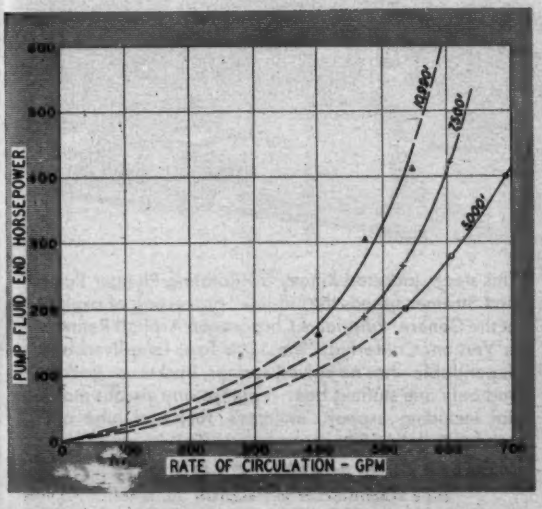

Fig. 1—Four-and-one-half-in. o.d. EUIF drill pipe. Fluid-end horsepower at three different depths using 10.3-lb.-per-gal. mud at a viscosity of 41 seconds A.P.I.

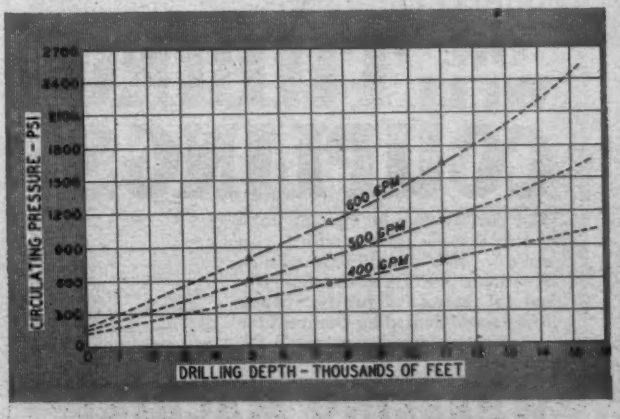

Fig. 1-A—Four-and-one-half-in. o.d. EUIF drill pipe. Circulating pressures at various circulating rates using 10.3-lb.-per-gal. mud at a viscosity of 41 seconds A.P.I.

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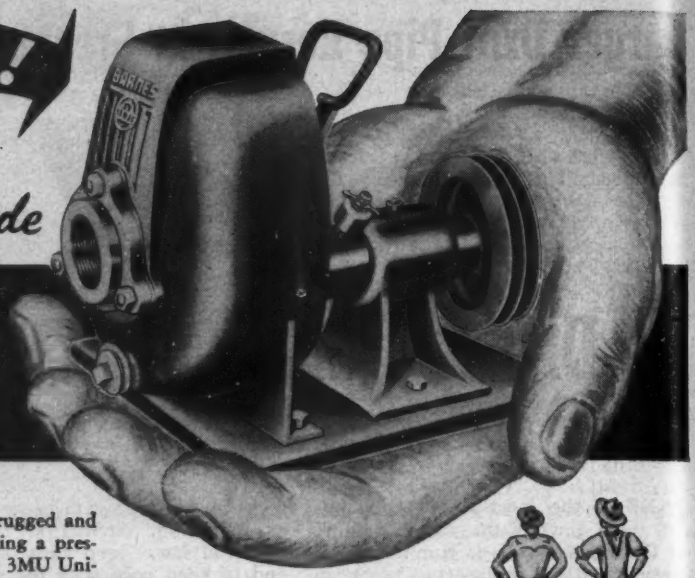

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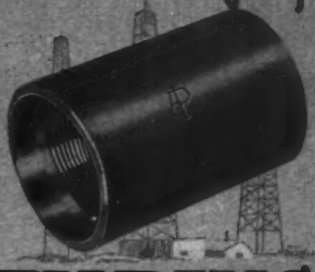

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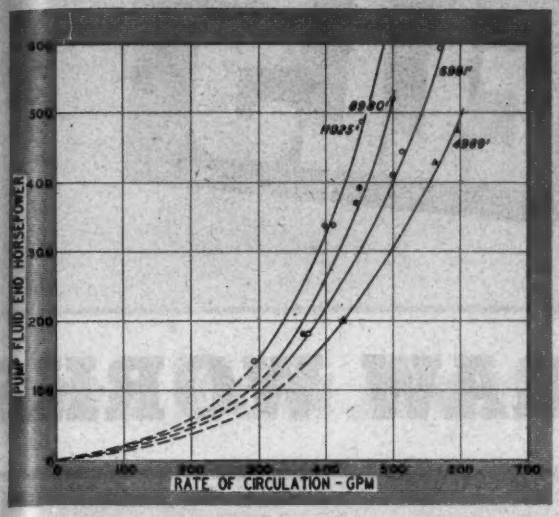


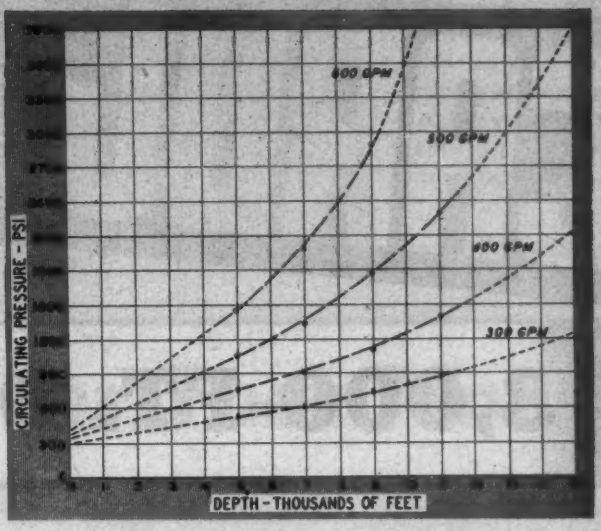


Fig. 2—(Left) Four-and-one-half-in. o.d. EUIF drill pipe. Fluid-end horsepower at four depths using 16.4-lb.-per-gal. mud at a viscosity of 44-41 seconds A.P.I.

Fig. 2-A—(Right) Four-and-one-half-in. o.d. EUIF drill pipe. Circulating pressures at various circulating rates using 16.4-lb.-per-gal. mud at a viscosity of 44-41 seconds A.P.I.

by the A.P.I. Committee on the Standardization of Oil-Country Tubular Goods, at the November 1946 Chicago meeting. The cost of this pipe is $0.41 per foot more than the 4½-in., which adds a cost of $5,740 to a 14,000-ft. string of drill pipe. However, in order to provide the same circulation rate with 4½-in. pipe, on a steam rig for example, an additional pump and boiler would be required. Even with increased pumping equipment the maintenance of high circulation rates would be attended by the usual increase in operating cost which result when operating at excessive pressures.

In going to the larger-sized drill pipe Humble did not find it necessary to alter in any way its 13⅜-in.-9⅝-in.-5½-in. casing program. The only adaptation necessitated through the use of larger drill pipe was with regard to elevators, pipe slips, and blowout preventers. The bottoms of the elevators were bored and rams

(Continued on page 153)

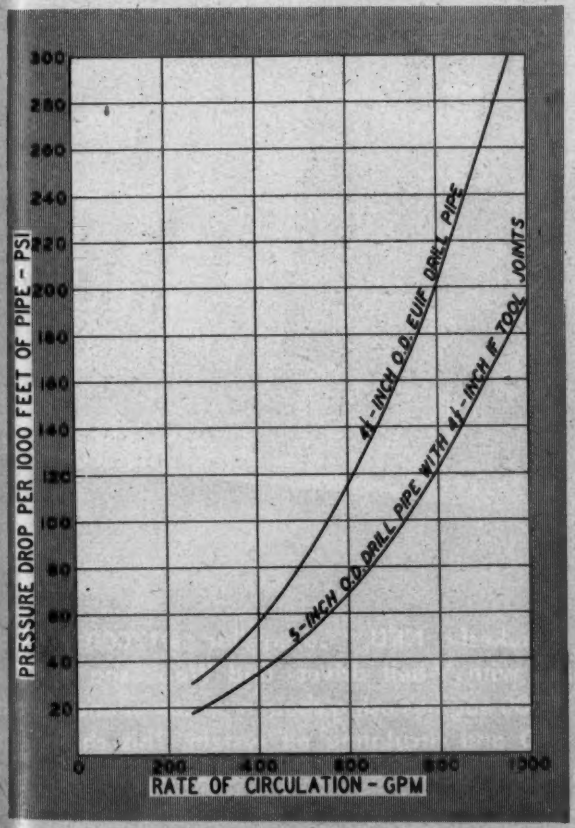
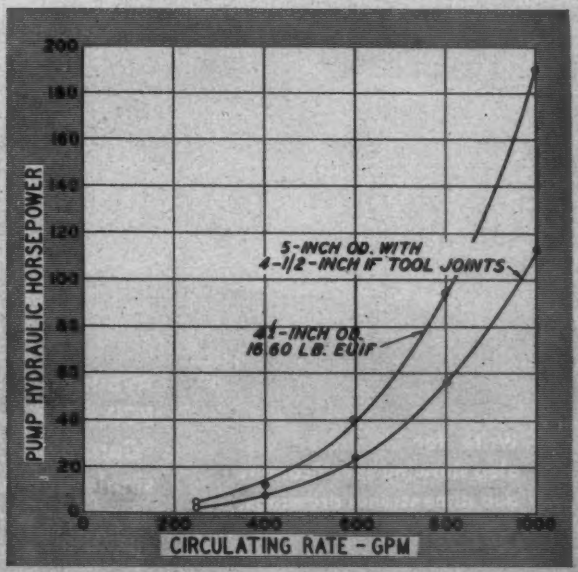

PRESSURE DROP PER 1000 FEET OF PIPE - PSI
RATE OF CIRCULATION - GPM
4½-INCH O.D. EUIF DRILL PIPE
5-INCH O.D. DRILL PIPE WITH 4½-INCH IF TOOL JOINTS

Fig. 3—(Left) Comparison in pressure drop between 4½-in. o.d. EUIF drill pipe and 5-in. o.d. with 4½-in. IF tool joints

Fig. 4—(Below) Comparative hydraulic horsepower required per 1,000 ft. of 4½ and 5-in. o.d. drill pipe. Mud weight 10 lb. per gal., viscosity 40 seconds A.P.I.



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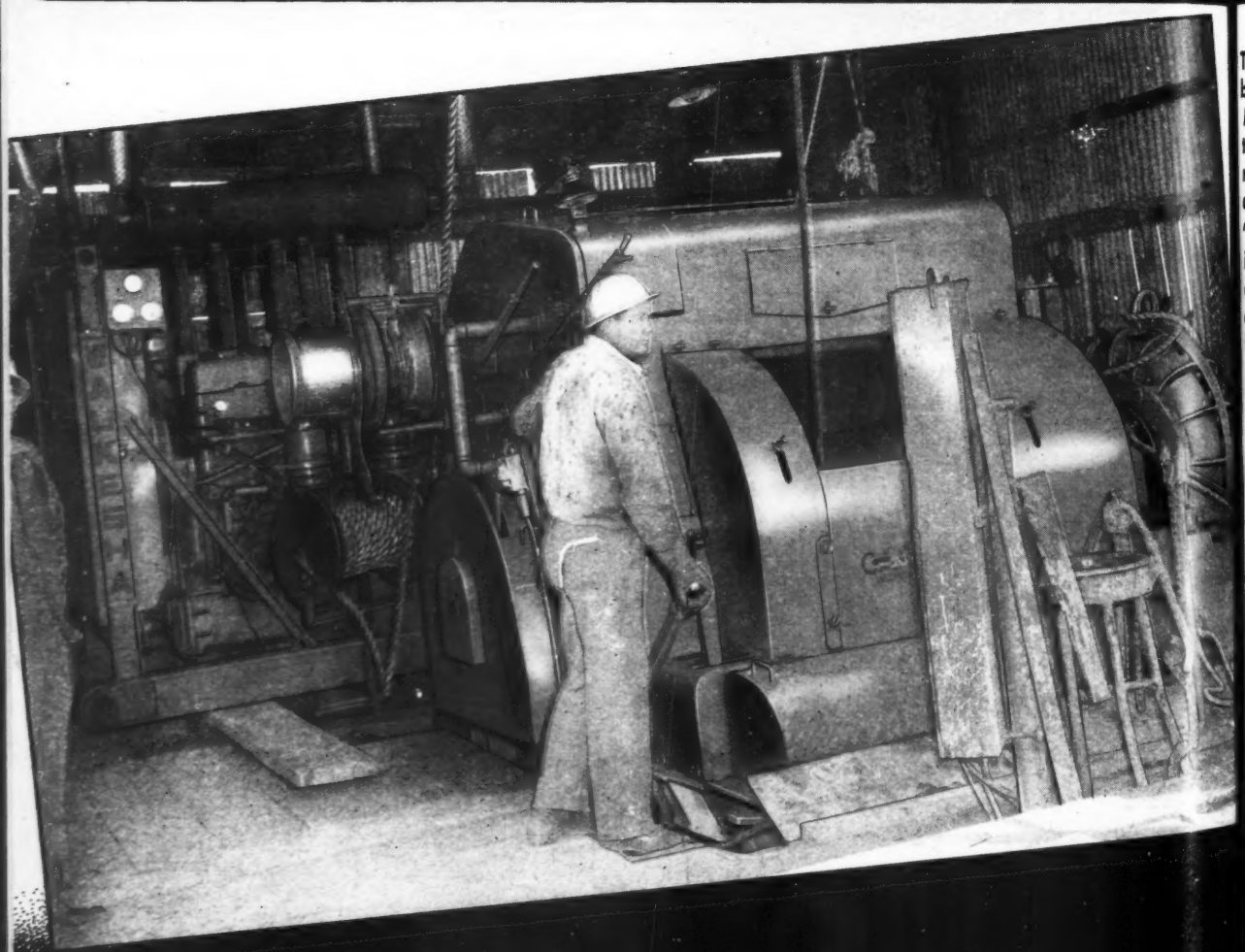

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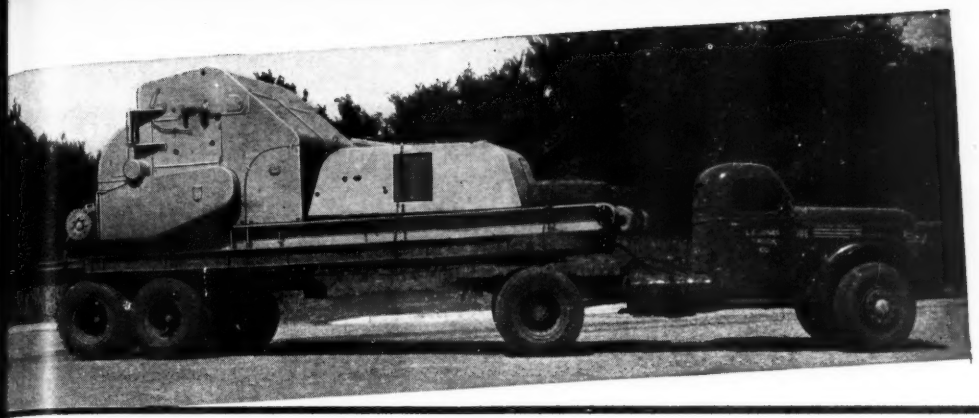

Draw works with V-belt drive can be transported over highway without special 8-foot permit by removing engines and catheads.

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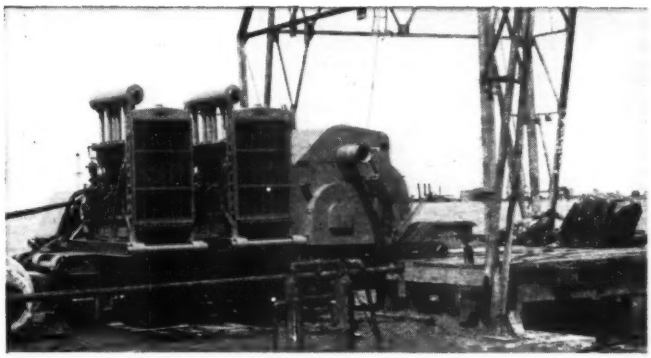
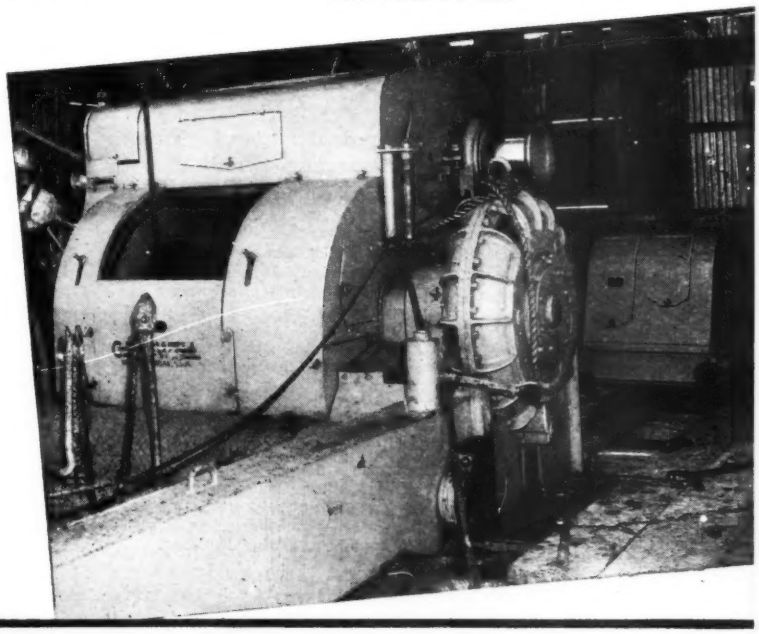


The rig-up time on this draw works is less than 50% of others of like capacity.

Optional hydromatic brake is attached direct to lower drum shaft.



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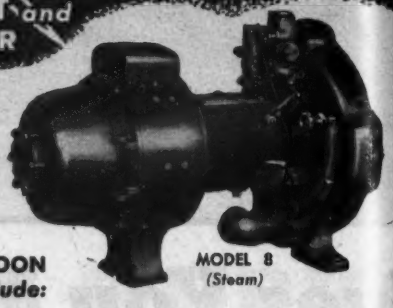

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in the blowout preventers changed to accommodate the 5-in. pipe. Also the inserts in the slips were changed. Changing over to the large-sized pipe added only about 10 per cent to the weight of a 14,000-ft. string of pipe. This additional weight imposed no change in trip time.

The Humble experience with the 5-in. o.d. drill pipe has brought out a number of advantages. Greater penetration rates have been recorded through the increased circulation possible with larger pipe and it is expected that stuck drill pipe will be greatly reduced. The 5-in. drill pipe offers 33 per cent more torsional strength than the 4½-in. and it is also expected that part of the wear usually absorbed by tool joints will be distributed over the drill pipe.

One of the questions raised during the preliminary investigation of the 5-in. was with regard to the possibility of excessive pressure drop in the annular space between the 5-in. o.d. drill pipe and the 9⅝-in. casing. Engineering observations on a Humble well drilling in Galveston Bay with 5-in. drill pipe showed that at no time during drilling were there indications of lost returns in addition to those normally observed while drilling with 4½-in. drill pipe.

On this particular well after setting 9⅝-in. casing at 7,073 ft., a maximum mud weight of 14.7 lb. per gal. was used while circulating at 9,922 ft. or with 1,849 ft. of open hole below the casing seat. The circulation rate at this depth was 470 g.p.m. During the drilling of the well the maximum circulation rate obtained was 567 g.p.m. with a 14-lb.-per-gal. mud at a depth of 8,300 ft. After encountering high-pressure salt water and gas at a depth of 8,000 ft., it was the usual practice to make a pull-up test before each trip until the total depth of 9,922 ft. was reached. It was observed there was no more gas-cutting than normally obtained with 4½-in. o.d. drill pipe.

As to the possibility of swabbing results while using the larger-sized pipe, Humble maintained a close check on one of its wells drilling in Southwest Texas. In this well 9,402 ft. of 9⅝-in. casing was set as an intermediary string, and an 8⅝-in. hole drilled to a total depth of 10,460 ft., requiring 14 round trips for drilling, coring, and reaming. At no time was there any indication that 5-in. o.d. drill pipe tended to induce lost returns while circulating or caused any unusual swabbing action while pulling out of the hole. During the time this well was drilled from 10,336 ft. to the total depth mud viscosity was maintained at an average of 80 seconds A.P.I. viscosity in an effort to clean the hole of sloughing shale. During this interval in particular, careful check was made to detect any swabbing conditions during trips and none were observed.

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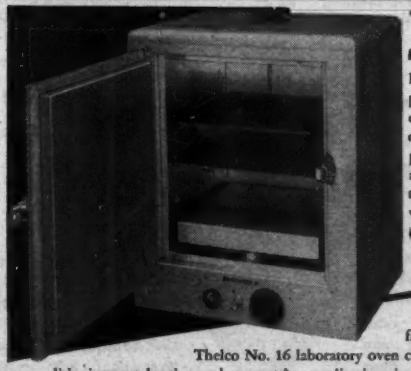

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Reproduced at the right is a typical temperature control chart produced by a recording thermo-couple showing accuracy of Model 16 oven. Note the straight band, providing thermostatic control accuracy and uniform width of band indicating temperature uniformity throughout working chamber — FEATURES NEVER OFFERED BEFORE IN A LOW PRICED OVEN.

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with any other block and connector arrangement

ON SPACE SAVINGS ALONE Baash-Ross Unitized Blocks rep resent a far-reaching advancement in portable rig equipmen For these Blocks combine in ONE rugged, compact unit *both* the travelin block and the hook or connector for supporting the drill string.

WORKING HEIGHT "A"

No. of Sheaves	SHEAVE DIAMETERS			
	20"	24"	30"	36"
1	50"	54"	60"	—
2	58"	62"	68"	—
3	65"	67"	73"	—
4	—	—	76"	82"

WORKING HEIGHT "A"

In the table at left are shown overall measurement for typical sizes of Baash-Ross Unitized Blocks. *Compare these dimensions with any other block and hoo arrangement of comparable capacity.* Only then wil you see how important are the space savings made by Baash-Ross Unitized Blocks—savings that actu ally add *extra feet* to the working height of you portable rigs. By adding more working room to you portable derricks, many vital savings are made..

FASTER TRIPS Risk of hitting crown is reduced, permitting faster operations, quicker round trips, more time on bottom.

GREATER SAFETY Increased working space means greater safety for both crew and equipment, fewer accidents, lower drilling costs.

LONGER PIPE Often the space saving of Unitized Blocks permit using longer pipe lengths, further speeding operations, saving time.

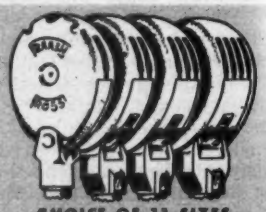
...and these advantages, too!

SIMPLER HOOK-UP

By eliminating extra elements in the hook-up, Baash-Ross Unitized Blocks are not only more compact, but also more streamlined than other arrangements. Nothing to catch in girts or rigging means still greater safety to crew and equipment, faster round trips and peak operating efficiency at all times.

CHOICE of TWO TYPES

Baash-Ross DB Unitized Blocks are available in two basic types—either with Hook (left) or with Link Adapter Unit (large illustration). Both styles are free-swiveling . . . or can be instantly locked in any one of 8 different positions. Also, both are spring loaded. Link Adapter unit is recommended for maximum capacity and simplicity.



CHOICE OF 11 SIZES

Not only are there two basic types of DB Blocks, but each type is available in choice of 1, 2 or 3 sheave models with capacities of 30, 65 and 100 tons, respectively, and each in choice of 20", 24" or 30" sheave diameters . . . or in a 4 sheave model with 150 ton capacity and choice of 30" or 36" diameter sheaves. There's a size for every job—one for your particular requirements!

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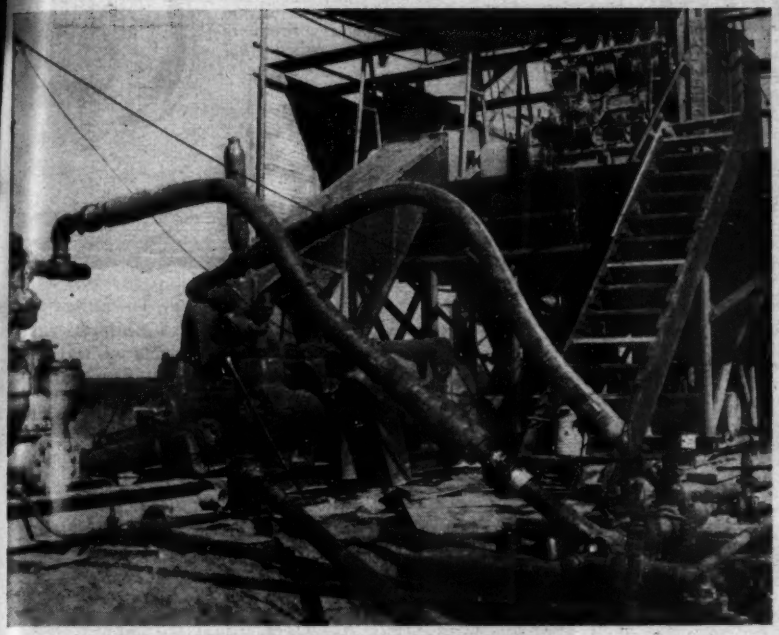
OPERATING IDEAS

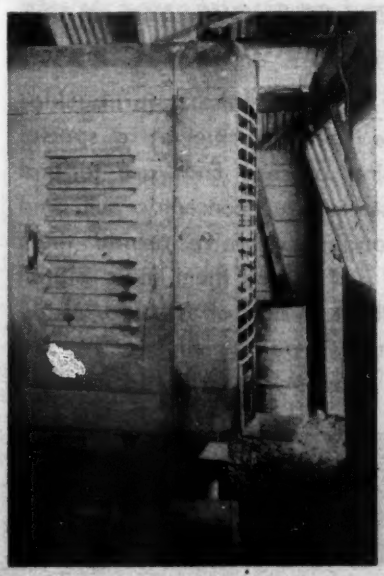


rig's engine installation above. The belt is perpendicular and does not need to be detached when the rig is moved.

Hose Used For Mud-Pump Connections

THE use of rotary hose for connecting the discharge of mud pumps with the manifold of a rig has certain advantages in expediting the work of installing equipment. For it makes it possible for operators to have more flexibility in the locating of pumps which may be placed where desired; there will not be need for changes in the piping. Hose connections are installed with a type of coupling which may be quickly installed and removed. This equipment serves a rig of J. R. Sharp Drilling Co., Winkler County, Texas.

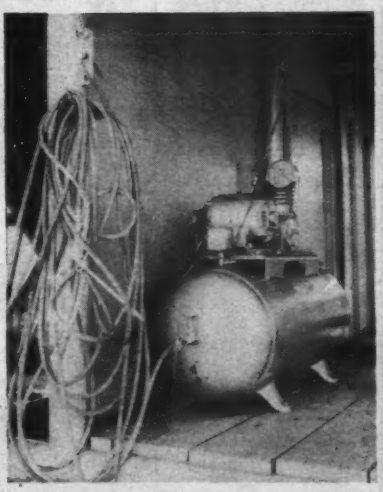
Step to Facilitate Servicing Motors



A CONVENIENT step is hooked to the lower part of the radiator of a six-cylinder motor which is used by operators during servicing. The use of this step eliminates the need of a step ladder which would be less safe as well as less handy. This step can be readily slipped off and attached to any of the three engines at this installation.

Light Plant Located In Substructure

IN the substructure of Sawyer Drilling Co.'s rig operating in the TXL field, Ector County, Texas, a light plant is installed which is fully enclosed. This is driven by a belt connected with a power takeoff at the



Air Compressor For Blowing Electric Drilling Motors

AN automatic air compressor similar to those used at filling stations is used for blowing out electric motors for drilling and for the operation of mud pumps of a rotary rig. When the rig is shut down each night for lubrication at the time of changing tours, the motors are thoroughly blown out. Noble Drilling Co. has adopted such air compressors as standard equipment for electric rigs.

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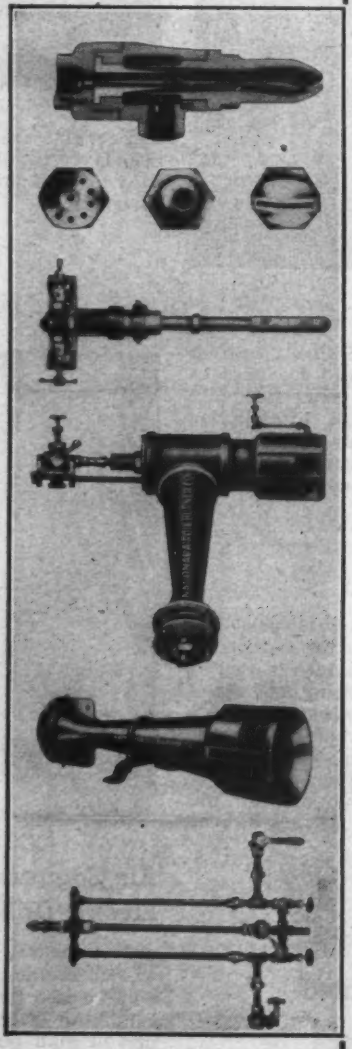

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PROGRESS IN METALS

by W. L. Nelson
Consulting Engineer

Inspection of Castings

IN general, nondestructive testing includes any method of inspection which will disclose the presence of defects in a part without destroying the part itself. When applied to castings, the definition may be extended to cover those methods which, while they may remove part of the casting, leave the final part still usable. There are a number of nondestructive inspection methods in regular use in foundries.

Visual examination consists of examining the surface of the casing with the unaided eye, the use of a hand lens or, in certain cases, low-power microscopes. This method is used to detect surface defects. Among the types of defects which are found by visual inspection are "burned-in" sand, blows, rat tails, cold shuts, swells, surface porosity, and surface cracks.

Sound or percussion tests are performed by striking the casting with a hammer, thus producing a characteristic tone which will be changed by the presence of discontinuities. This method is generally not very satisfactory. It can only be used to detect very large defects and even then is not always a dependable test.

Impact Tests

Impact tests involve impacting the casting in one of several ways to determine whether or not the piece will fail. The casting may be impacted by striking it with a hammer, dropping it from a specified height onto a solid plate, or by dropping a specified weight from a given height on the casting. Impact tests should not be trusted as acceptance tests for castings.

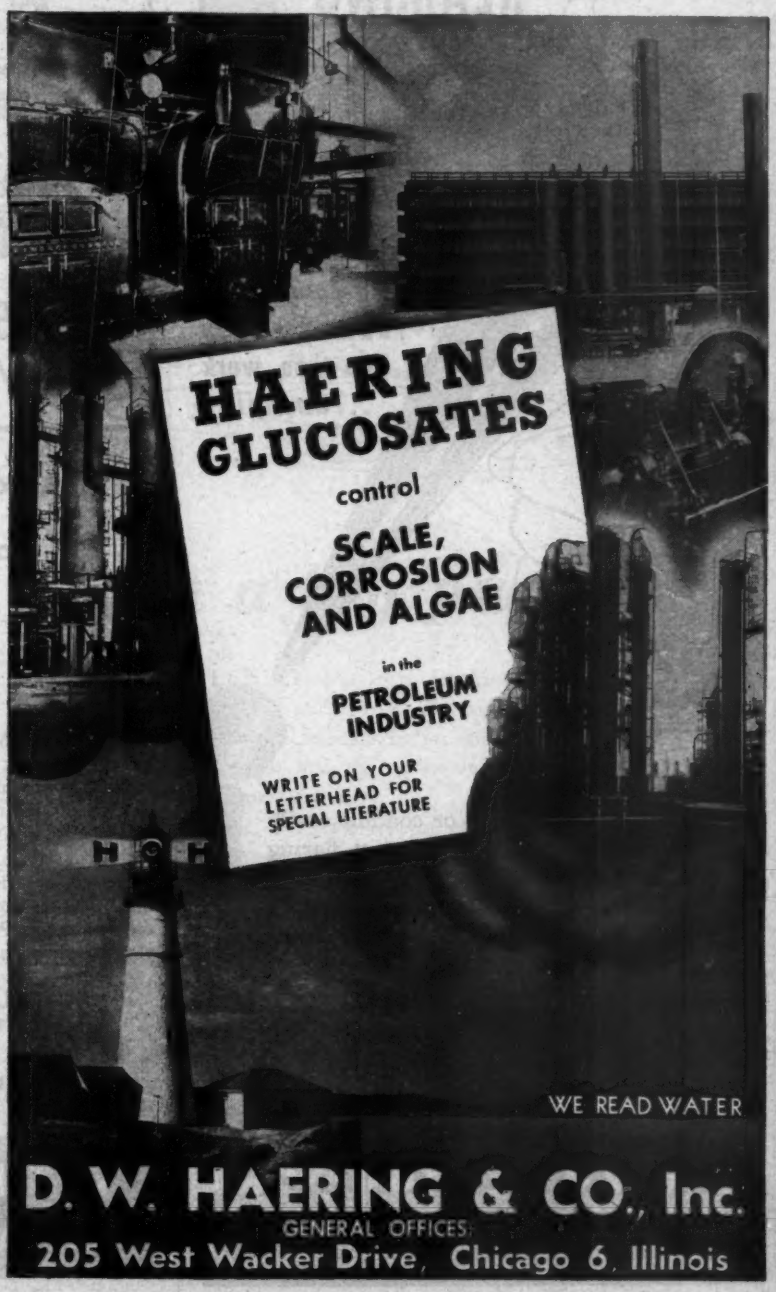
Pressure tests are used to locate leaks and to test the over-all strength of castings. Hydrostatic testing consists of filling the part with water under a specified pressure and examining the casting for leaks. The hydrostatic test shows over-all strength and the presence of leaks only at the time the test is made, and gives no real assurance that the part will continue free from defects in service. In service the casting may be subjected to stress variations which may cause filamentary shrinkage cracks to extend, thus causing leakage.

Steam and air may be used in pressure tests. However, steam should not be applied until the part has been hydrostatically tested. Air is particularly useful in testing small valves and fittings.

Radiograph

Radiographic examination using X-rays and gamma rays is another widely used nondestructive test in foundries. If a metal plate, for example, is exposed to X-ray or gamma rays, some will be absorbed by the plate; others will pass through. Defects inside the plate will absorb the rays to a lesser extent than the adjacent areas of the plate. Since the rays affect photographic emulsions in much the same way as light, a record of the defects present can be obtained.

The wave length of X-rays is inversely proportional to the applied voltage used in making X-rays. Sensitivity, or the ability to register small defects, increases with an increase in wave length. However, the



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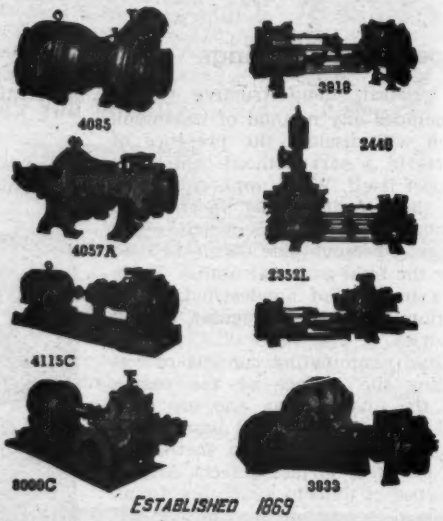

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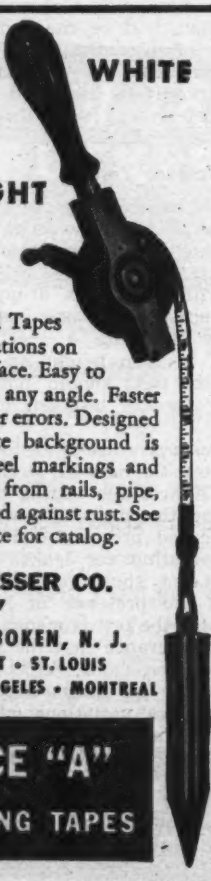

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penetration of the X-rays decreases with an increase in wave length. X-ray equipment rated at 220 kvp. is suitable for up to 3 in. of steel. Rays from 1,000,000-volt equipment can be used for up to 6 in. of steel.

Radiography using radium depends upon the emission of penetrating rays given off by radium. Gamma rays have very short wave lengths and high penetrating power. This method is useful where the production of a foundry is not sufficient to warrant high-voltage X-ray equipment. Since it is portable, the method is useful for jobs not accessible to X-ray methods.

Magnetic Inspection

Magnetic inspection can be used to reveal shallow, fine defects not possible to detect with radiography. To use magnetic inspection, the part being tested must be capable of being magnetized. In general, the test consists of applying magnetic particles to the surface of the magnetized casting. If defects are present, the particles will form a line around the defects.

Magnetic inspection is often limited to certain critical locations of castings. A variation of the magnetic test is in the use of magnetic particles covered with material which fluoresces under ultraviolet light.

In electrical conductivity tests an electric current is passed through the piece using a constant voltage and observing any change in the amount of current to pass through as an indication of defects. It is practicable only where a large number of castings of the same design are made to close tolerances.

Penetrant tests utilize a highly penetrating oil in which is dissolved a substance fluorescent under ultraviolet light. A powder is dusted on the surface; it absorbs oil where defects are located and indicates the defect under ultraviolet light.

Supersonic testing methods have only recently been developed. In one method sound waves are set up at one end of the object, travel through the object, and are reflected back either by the opposite end or by a flaw. The time of travel is measured. Thus, a flaw will be indicated by a shorter round-trip time than that of a wave being reflected from the end.

Abstract: Frear & Lyons, Nondestructive Inspection of Castings, American Foundryman, 9, 120, April 1946, taken from September issue of Materials and Methods.

Metallurgical Terms

Pig Iron

Pig iron may be defined as the intermediate ferrous product that is produced in a blast furnace. Except for a somewhat nonuniform composition, it may generally be considered as being the same as cast iron.

Resisting Caustic Corrosion

THE involvement of petroleum refining more and more deeply into chemical manufacture arouses a renewed interest in the use and handling of basic chemicals. The extreme corrosiveness of caustic soda has long been troublesome and not until recent years could it be supplied in a pure state because it attacked even the containers in which it was shipped. Pure nickel and the nickel alloys are among the most suitable agents for holding concentrated caustic soda. Table 1 indicates the relative resistance of some common metallic materials which were used in plant tests in a single-effect evaporator used in concentrating caustic soda from 30 to 50 per cent. The time of test was 16 days and the average temperature was 179° F.

TABLE 1 — CORROSION OF MATERIALS BY CAUSTIC SODA*

(30-50 per cent solution at 179° F.)

Material—	Corrosion rate, in. per year
Nickel	.00010
Monel metal	.00019
Copper-nickel-zinc (75-20-5)	.0005
Copper	.0023
Mild steel	.0037
Cast iron	.007
Cutlery stainless steel (14 per cent Cr.)	.033

*Tech. Bull. T-6, The International Nickel Co., Inc., New York.

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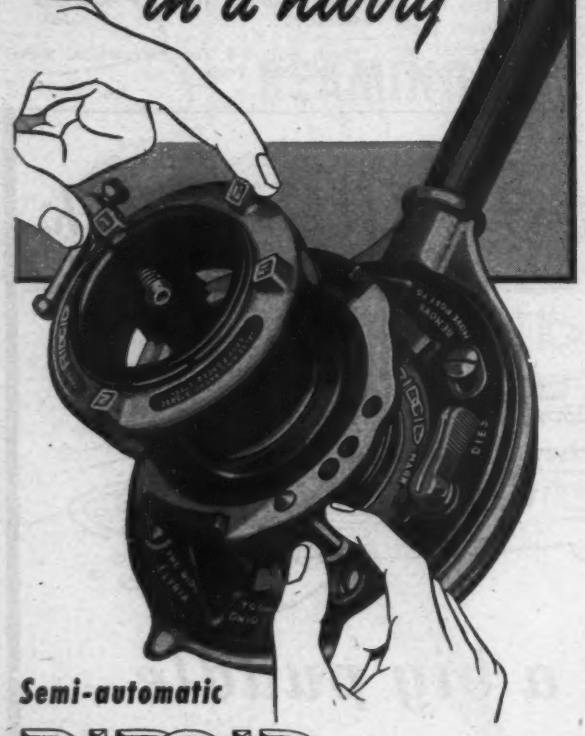

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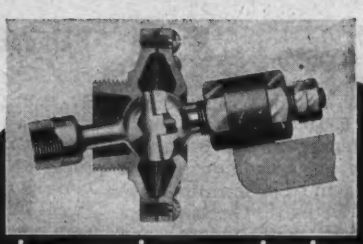

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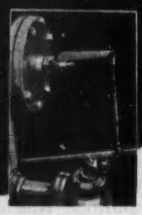

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A.S.T.M. STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS (WITH RELATED INFORMATION). Prepared by A.S.T.M. Committee D-2. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 615 pp. $4.

In addition to some 130 A.S.T.M. test methods, specifications, and definitions of terms relating to petroleum and petroleum products, this December 1946 compilation includes three proposed tests covering the sulfated residue of lubricating oils, test for phosphorus in organic materials, and test for aromatic hydrocarbons in mixture with naphthenes and paraffins by silica gel adsorption. This new edition has been considerably expanded by the inclusion of numerous specifications covering aromatic hydrocarbons—various grades of benzenes, naphthas, toluenes, and xylenes. Many of the test methods are issued in their revised form and a number of the procedures are new.

SEEN FROM E. A. By Herbert Feis. Alfred A. Knopf, New York. $2.75.

In this volume the author tells three of the most significant behind-the-scenes stories of America's desperate search for national security in the days just before December 7, 1941. Episode No. 1 is a vivid account of the efforts to acquire a reserve of rubber. How this was accomplished in the face of official indifference, private monopoly, and other handicaps makes an interesting narrative. Episode No. 2 is the inside story of the nation's plunge into the scramble for Middle East oil, and Episode No. 3 reviews the decay of international relations that resulted from the democracies' failure to prevent Mussolini from obtaining the oil essential to his depredations. See page 30, The Oil and Gas Journal, issue of February 1, 1946, for a fuller account of this absorbing book.

A.S.T.M. SPECIFICATIONS FOR STEEL PIPING MATERIALS. Prepared by A.S.T.M. Committee A-1. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 296 pp. $3.

In addition to all A.S.T.M. specifications covering steel piping and tubing, the December 1946 compilation of A.S.T.M. specifications includes requirements on a number of other materials which are used in piping installations, such as castings, forgings, bolting materials, and nuts. The book includes 14 specifications covering various types of pipe ranging from ordinary carbon pipe for a variety of uses to high-alloyed steels for high-temperature and high-pressure service. Thirteen specifications cover various types of boiler, superheater, and miscellaneous tubes including four standards on stainless tubing.

SAUDI ARABIA. By K. S. Twitchell. Published by Princeton University Press, Princeton, N. J. 192 pp. $2.50.

This is a straightforward account of the emergence of a little-known nation into the modern world. Its author is a mining engineer who investigated the natural resources of Saudi Arabia at the request of King Abdul Aziz ibn-Saud, traveling over 20,000 miles and in regions never before visited by a non-Moslem. The book presents first-hand information on the geography and climate, water supply, and transportation facilities of a new nation, one-third the size of the United States. The author describes the customs of the country to be encountered by foreign visitors, and centers of national life that have been hitherto little more than legendary names to the Western world. He includes a history of the powerful ruling house of Saud and an outline of the political administration. Lastly, he considers the position of Saudi Arabia in world economy—its contact with the West, its valuable oil and mine resources, and future possibilities for commerce and agriculture. The report is illustrated with photographs taken during the author's travels in the kingdom.

ORGANIZATION AND FUNCTIONING OF OIL-FIELD ENGINEERING COMMITTEES. Published by Interstate Oil Compact Commission, Oklahoma City. 36 pp.

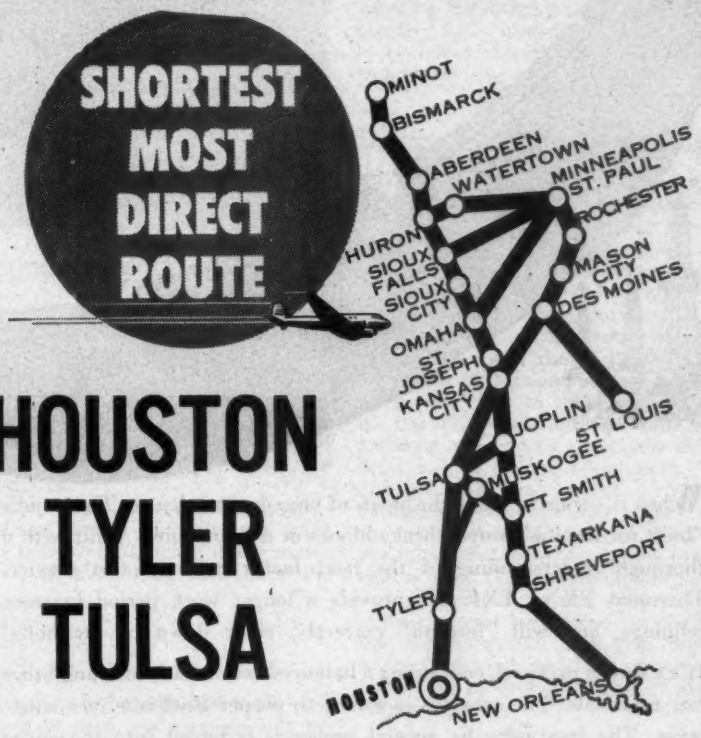
This publication contains report of a subcommittee of the commission's legal committee, appointed to study the subject of oil-field engineering committees and to draft provisions suitable for use in their organization. Included also are organization agreements of 11 engineering committees, as follows: Yates, Conroe, East Texas, Goldsmith, North Basin, Carthage, La Gloria, Seeligson, Lea County, West Edmond, and Mississippi.

THE PETROLEUM ALMANAC. A Statistical Record of the Petroleum Industry in the United States and Foreign Countries. Published by National Industrial Conference Board, 247 Park Avenue, New York. 420 pp.

This convenient reference source should prove of value not only to the oil industry but to industrial analysts, advertisers, students, and educators. It covers all phases of the industry—production, transportation, refining, marketing, finances, taxation, regulation, labor, and history. The information is all in tabular form. A 34-page index is provided for quick finding of the data sought.

MODERN PETROLEUM TECHNOLOGY. Published by The Institute of Petroleum, Manson House, 26, Portland Place, London, W. I., England. 466 pp. £1 1s.

The title of this volume gives an adequate description of its purpose, which is intended to make available the knowledge of those expert in one field of the petroleum industry to those engaged in other branches of the industry. In view of the widespread character of the petroleum industry, and of the tendency towards specialization in one particular section of industry or knowledge, it was felt that a relatively small volume of this type should



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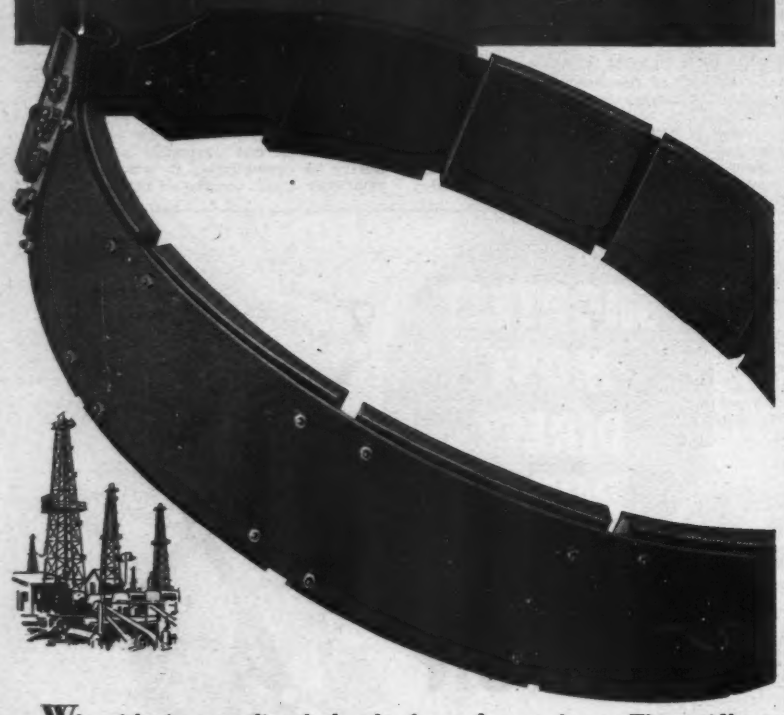

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Thermoid Rubber

be of value in presenting some record of the present stage reached in technical knowledge. The book has been written by separate authors, and no attempt has been made to limit rigidly the method of treatment in the individual sections, although it is hoped that the composite picture presented gives an adequate account of the present state of petroleum technology. The sections have been written at various times, and where necessary additions have been made to the sections to include some of the most important advances made in wartime which have recently been released for publication. The chapters cover all phases of petroleum operations—exploration, drilling, production, refining, chemistry, utilization, and distribution.

Army Officers Study Petroleum Engineering

Col. G. A. Vogel, executive officer of the Army-Navy Petroleum Board, Col. Webster Anderson, chief of the Fuels and Lubricants Division of the Office of the Quartermaster General, and Colonel Anderson's administrative assistant, E. B. Juliber, attended University of Pittsburgh's commencement exercises on February 5. The occasion of this visit was the completion by 11 officers, of a year's graduate work in petroleum engineering. This is the first group of officers to be so trained under a continuing program set up by the Office of the Quartermaster General in Washington, to assure the Army of officers intelligently informed with regard to the problems of the petroleum industry so that more effective utilization of petroleum products and closer cooperation between the Army and the oil industry will promote our national security.

The setting up of this program is the result of the Army's appreciation of the fundamental importance of petroleum in all military operations and the recognition of the fact that heretofore Army officers have not been sufficiently familiar with the complex problems of the petroleum industry whose operations are of such vital importance in the problem of national security.

Following his year's work here each of these men was assigned to a different oil company for a year of practical experience in various industrial operations. At the conclusion of their year in industry the men will resume their duties in the regular Army. Most of the men are graduates of the Military Academy at West Point and all have seen active duty in combat areas throughout the world during the last war.

Lt. Col. Merton Singer has been assigned to Gulf Oil Corp. and will obtain the major part of his industrial training in Pittsburgh. The other men have been assigned to Sun Oil Co., Shell Oil Co., Inc., Standard Oil Co. of New Jersey, Socony-Vacuum Oil Co., Inc., Standard Oil Co. of California, Cities Service Oil Co., Standard Oil Co. of Ohio, Pan American Petroleum Co., and The Texas Co.

PLANT PRACTICES

Simple Tool Aids Exchanger Cleaning Operations

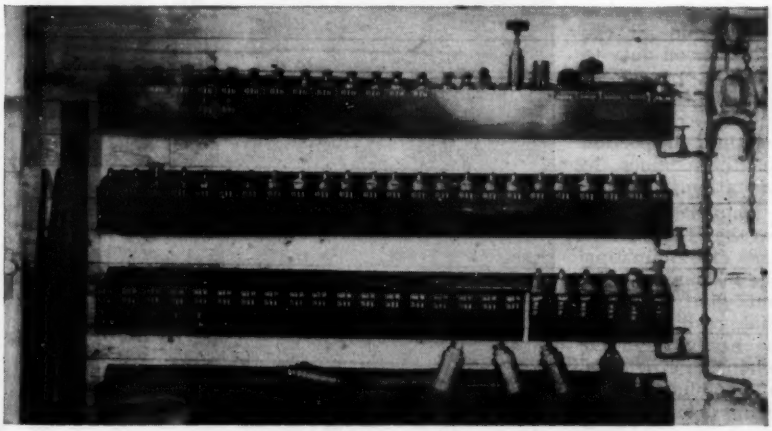
HEAVY deposits of coke or other material on exchanger tubes are broken up, for subsequent removal by other methods, with the simple tool shown in the photograph. Made of 2 by 1/16-in. spring steel, the tool measures 42 in. over-all and is equipped with a comfortable hand grip which is made of ¾-in. pipe. The handle, flared on one end to prevent its slipping easily from the operator's hand, is attached to the spring-steel blade with two iron rivets. About 15 in. of the blade is serrated to a depth of ¼ in. at ½ in. pitch. If desirable the serrated section of the tool may be tapered from 2 to 1½ in. and its extreme end given a sharper taper for 1 or 2 in.

Several of the blades may be machined at one operation if suitable apparatus to serve as a holding jig is available. When a number of blades are made at one machining setup the operation may be performed quickly if the material is suitably annealed; after completion of all machining operations the blade should be properly treated.

Pneumatic-Tool Storage Rack

TUBE rolls or expanders and other similar tools may be kept free from rust and dirt while in storage if immersed in an oil bath. An arrangement for storing such tools in this manner is shown in the accompanying photograph. Formed from black sheet steel and welded, the trough is divided into compartments of sufficient size to accommodate the various tools. Partitions are made fast to the trough sides by tack welding for about 2 in. along each wall of the trough. Although extending to the bottom of the trough the partitions do not form oil-tight compartments. After all fabrication work was completed, the troughs were sand blasted inside and out and the cleaned surfaces coated with oil-resisting paint.

Ordinary light cylinder oil is used for the tool bath which is renewed from time to time. A valved manifold is connected to each trough for draining the oil into a receiver. The troughs are attached to the wall of the maintenance tool room where the oil may be kept warm in the building during winter time. Before being placed in their respective compartments, all tools are placed in good working condition and cleaned thoroughly. This procedure permits tools to be taken directly from storage for immediate use.



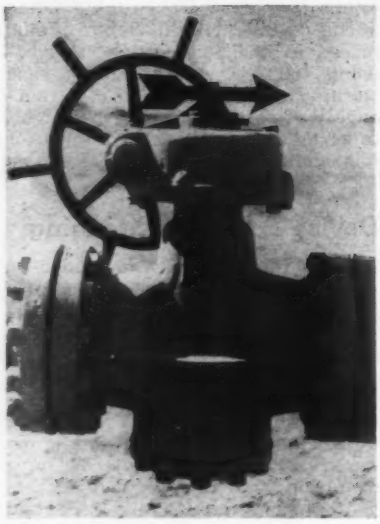
Device For Pipe Threading

FIELD threading of 3, 4, and 6-in. pipe is reduced to a comparatively simple operation with the hub attachment shown in the photograph. In operation the dies, after being started on the pipe in the usual manner, are kept stationary while the pipe is rotated until the desired length of thread has been made. Power from the truck is transmitted to the pipe by placing two or three half hitches of the chain around the pipe and hooking one end of the chain to the driving arm on the attachment. The end of the pipe which is being threaded is supported by a jack and the other end by the extension on the hub attachment. Since this extension is 2-in. pipe size, pipe having an inside diameter which will not fit over it cannot be rotated for threading. Where smaller than 3-in. pipe is to be threaded another attachment having an extension of smaller diameter is used.

PIPE-LINE SUGGESTIONS

Plug-Valve Position Indicator

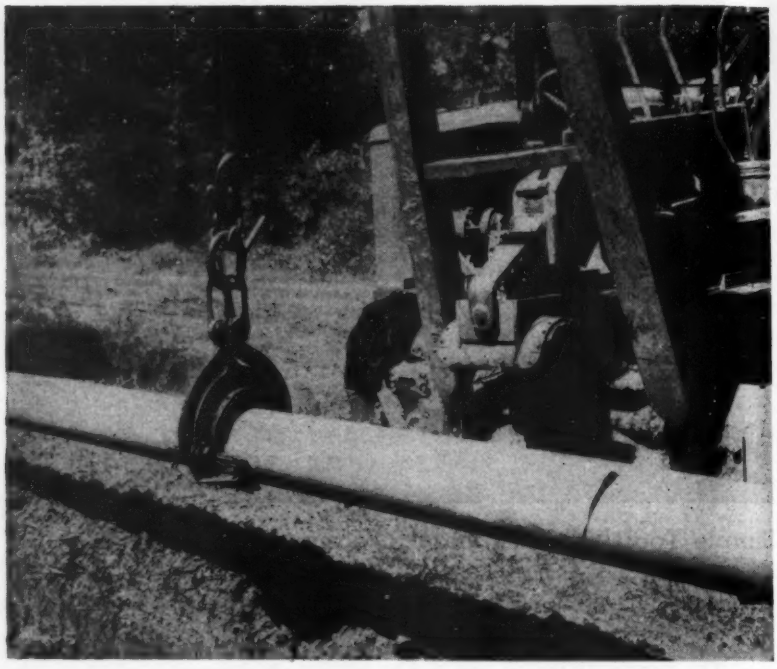
A POSITION indicator such as that shown in the photograph has proved useful on many occasions. Installation of a manifold valve in one of the compressor stations of a



major company, the indicator is visible clearly from the main operating floor of the compressor building about 25 ft. away. Cut from 11-gage sheet and painted to contrast with surrounding objects, the indicator or pointer is attached to the projecting portion of the valve plug. The bracket for attaching pointer to plug is incorporated into the layout of the pointer and is made sufficiently long to permit a portion of it to be bent at a right angle to form a foot for the bracket. Normally an ordinary ¼-in., slotted-head screw is used for attaching the pointer to the valve plug. Three or four full threads for screw engagement will hold the pointer in correct position for the usual installation.

Better Handling of Yard-Coated Pipe

MORE satisfactory handling of yard-coated pipe by the pipe gang on the right-of-way has been achieved by using tongs with special extensions for gripping both sides of the pipe. These extensions are padded and serve the purpose of distributing, over a wider area, the pressure which is applied by the tongs while the pipe is suspended during line-up operations. The pipe has been doped at a



yard several miles from the right-of-way. Protection applied consists of double coating and wrapping with two coats of asphalt, an intermediate wrapping of glass mat, an outside wrapping of asbestos felt and a final wrapping of kraft paper. At the base of the A-frame of the boom tractor is the bending shoe equipped with padding.

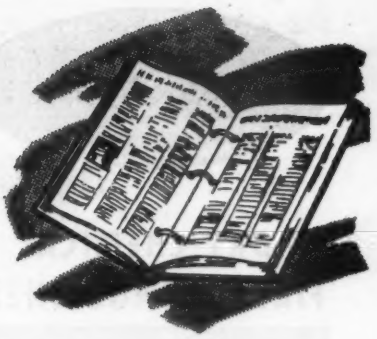
Fluorescent Light at Diesel Engine Aids in Checking Pyrometer

TO facilitate the observation of exhaust temperatures, a fluorescent light has been installed under the walkway of a vertical diesel engine at a main-line pump station. This makes it possible for the engineer on duty to see the pyrometer without difficulty in the course of routine inspection of the engines in operation.

Fluorescent lighting has the advantage of illuminating the instrument without glare so that dial readings may be easily observed when the efficiency of combustion is being determined.

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Transfer-Line Pressure Drop

CONDITIONS:

1. Refer to The Refiner's Notebook No. 128, January 25, 1947, for temperature drop in transfer line.

2. Throughput based on cold (60° F.) velocity in transfer line.

3. Use length of transfer line plus equivalent length of fittings.

4. Based on so-called atmospheric towers at 1-15 psig. probably gives reasonable results up to 60 psig.

5. Stock A has a true boiling point slope of 4.0 (gas oil, topped crude, raw naphthas, benzenes).

6. Stock B has a true boiling point slope of 7.0 (mainly for crude oil).

7. Use—estimate per cent vaporized in tower, compute equivalent length and cold velocity. Read pressure drop.

8. Back pressure held on still equals tower pressure plus ΔP.

APPROXIMATE PRESSURE DROP (ΔP) FROM PIPE-STILL OUTLET TO VAPORIZER—PSI.

Equivalent Length of Transfer Line—Ft.	Kind of Stock	20% VAPORIZED IN TOWER — Cold Vel. (60° F.) IN LINE—ft./sec.							40% VAPORIZED IN TOWER — Cold Vel. (60° F.) IN LINE—ft./sec.						
		2	3	4	5	6	7	8	2	3	4	5	6	7	8
20	A	..	..	..	..	..	..	18	..	..	..	..	19	20	23
	B	..	..	..	..	..	..	19	..	..	..	..	20	25	30
40	A	..	..	..	..	18	20	24	..	..	19	20	23	25	28
	B	..	..	..	..	20	25	34	..	..	20	27	33	47	63
60	A	..	..	17	18	21	23	26	..	17	20	23	26	29	32
	B	..	..	18	22	27	34	43	..	18	25	35	53	71	91
80	A	..	..	17	20	23	26	28	..	18	22	25	28	31	34
	B	..	..	19	26	34	43	50	..	20	30	50	71	91	109
100	A	..	..	18	22	25	28	30	..	21	24	28	31	34	36
	B	..	..	21	30	41	53	62	..	28	42	60	86	109	134
150	A	..	18	22	26	29	32	..	17	22	27	31	35	39	42
	B	..	21	29	39	53	69	..	19	33	59	86	109	142	...
200	A	17	20	24	28	31	35	..	19	25	30	35	39	42	...
	B	18	26	37	48	62	77	..	22	42	75	109	133	158	...
		60% VAPORIZED IN TOWER							80% VAPORIZED IN TOWER						
10	A	..	..	..	..	..	..	19	..	..	..	..	17	18	19	22
	B	..	..	..	..	..	..	21	..	..	..	..	18	19	22	28
20	A	..	..	..	..	20	22	26	..	..	18	20	23	26	29
	B	..	..	..	18	24	34	46	..	18	19	25	34	46	65
40	A	..	..	20	23	27	30	33	..	..	22	26	30	33	35
	B	..	18	25	35	52	72	101	..	18	29	49	81	117	157
60	A	..	..	23	27	31	34	39	17	22	26	30	34	38	42
	B	..	21	34	49	77	108	155	18	31	53	87	127	..	..
80	A	17	21	25	29	34	39	46	17	23	29	33	37	41	45
	B	18	28	44	68	101	144	..	18	28	69	108	157	..	..
100	A	17	22	27	32	38	44	50	18	25	31	35	40	45	49
	B	18	32	56	88	126	..	..	21	44	86	137	..	..	..
150	A	19	25	32	38	44	52	56	21	29	36	38	45	49	..
	B	21	42	77	117	167	..	..	26	69	137	..	..	..	..
200	A	21	28	35	42	48	56	64	24	31	38	43	49	54	..
	B	28	56	101	155	..	..	..	36	94	171	..	..	..	..

No. 132 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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TYPE "C"
CHEMICAL MEASURING
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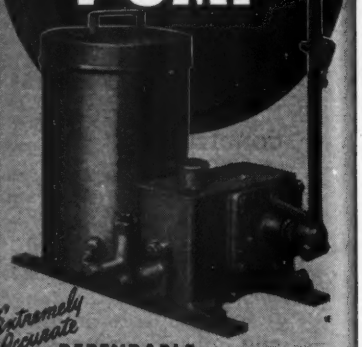

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ENGINEERING fundamentals

Identification of Scale Deposits

IN addition to the microscope and gravimetric chemical analyses, a useful tool in identifying boiler scale deposits is the X-ray diffraction method. Any material possessing a crystalline structure will yield a distinctive X-ray pattern which will always be the same and which can be compared with the pattern of standard materials on file. It is thus possible to identify complex chemical compounds and their individual crystalline structure whereas only the hypothetical structure could be obtained from the usual chemical analysis.

Table 1 illustrates some of the common and uncommon constituents of boiler scale which have been identified by X-ray methods. Some of the salts could readily be determined by the conventional chemical analysis. Others, such as the complex alumino-silicates, could hardly have been identified except with the use of X-ray diffraction methods.

Internal Chemical Treatment

It is well to realize that the prevention of boiler scale cannot be predicted by any basic chemical principle. It is the physical characteristics of the precipitate formed in the boiler water that determines whether or not the precipitate will tend to tightly adhere to the boiler heating surfaces—the chemical characteristics of the precipitate are relatively unimportant. Thus, from a chemical standpoint sodium silicate will precipitate the calcium and magnesium salts just as well as a phosphate or carbonate. However, it is the physical characteristics of the precipitate that are of importance, for a precipitate of calcium silicate will tightly adhere to the heating surfaces.

For the prevention of calcium and magnesium salts from baking on boiler evaporative surfaces, internal treatment consists of precipitating the calcium and magnesium salts in a favorable form as sludge, and maintaining this sludge in a fluid form to be removed by the boiler blowdown.

The most common chemicals employed for the precipitation of the soluble calcium salts are the sodium phosphates—trisodium phosphate, disodium phosphate, sodium metaphosphate, and monosodium phosphate. Once any of these phosphates enter the boiler, their action is exactly the same. Another type of internal treatment for the prevention of scale is what is commonly known as carbonate-organic treatment. This type treatment has definite uses and limitations.

The prevention of scale due to silica is primarily an external problem. The maintenance of high residual phosphate and alkalinity concentrations in the boiler water are of aid in the prevention of silica scale, but can cope with low silica concentrations only. If the boiler water contains appreciable silica, it must be removed externally. Generally speaking, the silica content of the boiler feed water should be less than 5 p.p.m., especially if the boiler is operating at pressures greater than 450 psi.

Oil should always be externally removed from the boiler feed water. There is no method of internal chemical treatment specifically adaptable to overcoming the hazards presented by oil contamination of the boiler water. While certain methods of internal treatment may slightly aggravate or slightly minimize the problem caused by oil, there is no internal method of treatment which can be relied upon to cope with any appreciable degree of oil contamination.

This installment concludes the discussions on the general subject of water treatment, taken from the Betz Handbook for Industrial Water Conditioning, written and published by W. H. and L. D. Betz, consulting engineers, Philadelphia. The discussions began in the issue of November 2, and have appeared weekly since then.

Control

The use of internal chemical treatment, regardless of the excellence of the materials employed, is valueless unless it is closely controlled by means of daily chemical tests of the boiler water by the plant personnel.

Feeding of Internal-Treatment Chemicals

A satisfactory method of feeding chemical correctives is second only in importance to the consistent control of chemical balances. However, some feed water problems dictate the necessity of highly efficient feeding methods before adequate chemical control can be established and maintained.

Chemical feeding systems may be generally classified as (1) shot and (2) continuous. While it is desirable to feed all chemicals continuously (provided the proper point of application has been selected), it is frequently necessary to resort to "shot" methods because of financial or other reasons.

TABLE 1—CRYSTALLINE SCALE CONSTITUENTS, IDENTIFIED BY X-RAY DIFFRACTION

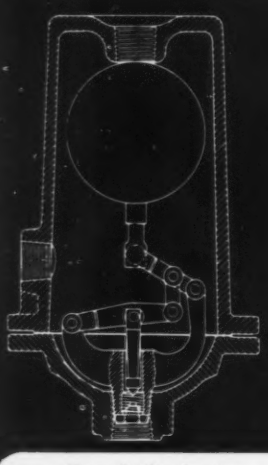
Name—	Formula
Acmite	$Na_2O \cdot Fe_2O_3 \cdot 4SiO_2$
Analcite	$Na_2O \cdot Al_2O_3 \cdot 4SiO_2 \cdot 2H_2O$
Anhydrite	$CaSO_4$
Aragonite	$CaCO_3$
Brucite	$Mg(OH)_2$
Calcite	$CaCO_3$
Cancrinite	$4Na_2O \cdot CaO \cdot 4Al_2O_3 \cdot 2CO_2 \cdot 9SiO_2 \cdot 3H_2O$
Hematite	Fe_2O_3
Hydroxyapatite	$Ca_{10}(OH)_2(PO_4)_6$
Magnetite	Fe_3O_4
Noselite	$4Na_2O \cdot 3Al_2O_3 \cdot 6SiO_2 \cdot SO_4$
Pectolite	$Na_2O \cdot 4CaO \cdot 6SiO_2 \cdot H_2O$
Quartz	SiO_2
Serpentine	$3MgO \cdot 2SiO_2 \cdot 2H_2O$
Thenardite	Na_2SO_4
Wollastonite	$CaSiO_3$
Xonotlite	$5CaO \cdot 5SiO_2 \cdot H_2O$

For shot feeding a conventional pot or bypass feeder may be used, connected across the suction and discharge of the boiler feed pump. An eductor can be used for feeding against low discharge pressures in a shot fashion.

The use of small chemical pumps is highly desirable from the standpoint of continuous application and need for little attention. The controlled-volume chemical pump (properly modified) will respond accurately to any system of proportionality transmission including differential pressure, flow, meter contactors, pH actuation or self-positioning potentiometers.

for *Clean Cut Separation* of water from gasoline

The ARMSTRONG Gasoline/Water Trap



Cross Section Armstrong Gasoline/Water Trap.

ARMSTRONG Gasoline/Water Traps are used for interface service to keep the water level down to a predetermined point in any open or closed vessel in which incoming water and gasoline have a chance to settle and separate. This includes storage tanks, rundown tanks, accumulators, etc. Capacities of these traps run as high as 8000 lbs. of water per hour, continuous discharge. For complete data and prices, ask for Catalog H, 3rd Edition, which also contains valuable data on condensate drainage. ARMSTRONG MACHINE WORKS, 868 Maple St., Three Rivers, Michigan.

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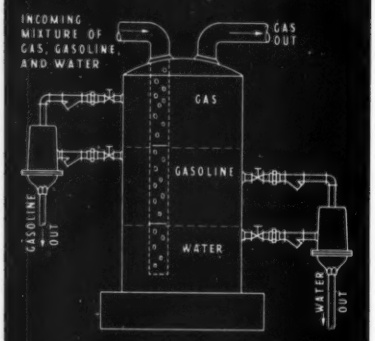
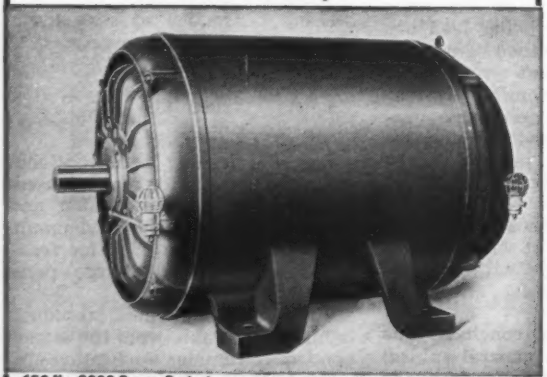
Air Traps
Gasoline/Water Traps

For Refineries, Gas Pipe Lines Drilling Rigs



Armstrong Gasoline/Water Traps on Accumulator.

Continental
EXPLOSION-PROOF MOTORS
1 to 600 Hp.



150 Hp. 3600 R.p.m. Explosion-Proof Motor with oil lubricated ball bearings

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MODERN Rotary DRILLING

Drilling Derricks

THE performance of a standard rotary-drilling derrick is so trouble-free and satisfactory that it is easy to overlook the fact that a drilling derrick is subjected to very severe service and that it must meet requirements quite different from those imposed on other structures of similar type. A drilling derrick must be light, portable, easily erected and dismantled. It must be capable of handling not only heavy pulling loads, but also shock and vibratory loads, twisting strains, and reversal of stresses. It must be able to withstand high winds. It is subjected, quite often, to considerable abuse in handling. The fact that a modern drilling derrick does meet these requirements is a result of years of work and studies of design to which the A.P.I. Committee on Standardization of Rigs and Derricks made an especially important contribution.

A.P.I. Derricks

The A.P.I. standards cover dimensions of derricks and their parts, safe working and wind-load capacities, together with methods of computing these capacities, and certain details of construction. Table 1 shows some of the most important dimensions of A.P.I. derricks, the data given being a summary of dimensional data of the twelfth edition of A.P.I. Standards No. 4, published in July 1944.

The A.P.I. safe-load capacity of a derrick is a sum of the strength of its four leg members at their weakest section. Shown on the name plate of an A.P.I. derrick, this capacity has an ample factor of safety, provided certain simple but important rules are observed.

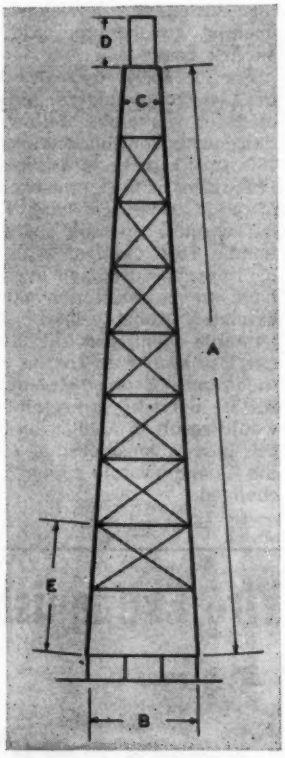


Fig. 5—Some of the dimensions of an A.P.I. derrick. (Letters refer to dimensions shown in Table 1.) C = water-table opening; E = window-opening height, in the clear

TABLE 1—SUMMARY OF DIMENSIONS OF AN A.P.I. DERRICK
(Letters refer to dimensions shown in Fig. 5)

Size No.	Dimensions A Nominal	A Tolerance	B Nominal	B Tolerance	C Nominal	C Tolerance	D Min.	E Min.
10	80′0″	+6″	20′0″	±5″	5′6″	±2″	8′0″	23′8″
11	87′0″	+6″	20′0″	±5″	5′6″	±2″	8′0″	23′8″
12	94′0″	+6″	24′0″	±5″	5′6″	±2″	8′0″	23′8″
16	122′0″	+6″	24′0″	±5″	5′6″	±2″	10′0″	23′8″
18	136′0″	+6″	26′0″	±5″	5′6″	±2″	12′0″	23′8″
18A	136′0″	+6″	30′0″	±5″	5′6″	±2″	12′0″	23′8″

The A.P.I. code of recommended field practices for derricks stresses the importance of suitable foundations, proper manner of erection, avoiding of sudden and eccentric loadings, and of proper dead-line anchorage. The latter is of importance since, for instance, anchoring of the dead line to the derrick corner on the same side as the draw works reduces the capacity of the derrick approximately 40 per cent.

The capacity of a derrick depends on the size of its leg members, size and arrangement of girts braces, type of steel used and other factors. This results in a choice of derricks of different capacities for each A.P.I. size. For instance, in A.P.I. size No. 18, that is 136 ft. height and 26 ft. base, types of silicon-steel derricks are available ranging in capacity from 333,000 to 952,000 lb. Special-order derricks with capacity of 1,027,000 lb. are used.

The A.P.I. derricks are designed for 70 m.p.h. minimum wind-load capacity, provided they are anchored to suitable foundations. Derricks for greater wind loading are built. A derrick designed by one manufacturer for 125 m.p.h. wind load, withstood satisfactorily a recent Gulf hurricane during which the winds reached the velocity of over 120 m.p.h.

Recent Changes

There have been few if any important changes in the design of A.P.I. derricks during the last few years. Individual operators added to the derricks different refinements, having as their purpose increased safety and better protection of equipment. One large operator extends the ladder to the top of the gin pole and attaches a working platform to the gin-pole frame, to increase the safety of work in this portion of the derrick. The first girt on the tool-ramp side of the derrick is protected by a length of a 5-in. o.d. pipe. This is done to eliminate possible damage to the girt when pulling in heavy equipment with a catline. In view of the present trend toward use of extra-long drilling lines, a special dead-line anchor is provided. The anchor eliminates sharp bends in the drilling line and the use of the wire-line clips. The line is held by friction, resulting from three full wraps on the anchor drum. The anchor is bolted to the substructure corner column. The reaction from the pull of the line is taken

(Continued on next page)

No. 8 in a series by Joseph Zaba, petroleum engineer, Houston

Modern Rotary Drilling (continued)

by a thrust plate attached to the corner column and underside of the derrick foundation plate.

Non-A.P.I. Derricks

As shown by Table 1, the maximum height of a standard A.P.I. derrick as prescribed by present specifications, is 136 ft. For very deep wells particularly in hard-formation drilling, where frequent pulling out of bit is necessary, taller derricks reduce considerably the time required for trip with the tools, by making possible pulling out of drill pipe in longer stands. Because of this fact derricks are built and are used with the height greater than the maximum A.P.I. height. Since no standards are available, these derricks are more of a custom-made type and reflect primarily the opinions, preferences, and ideas of individual operators and manufacturers. Derricks with height of 178 ft., safe capacity of 952,000 lb., 5-ft. 6-in. water-table openings, and bases of 32, 36, or 37 ft. are available. Design has been prepared for one of the large operators of a derrick with height of 185 ft., water-table opening of 6 ft., 8 in. and 40-ft. base.

Future Trends

The A.P.I. Committee on Standardization of Rigs and Derricks had on its agenda the question of tall derricks for a considerable period of time. The problem is difficult and controversial and it will be some time before the standards are arrived at. The difficulty lies in the interrelation of different factors affecting the derrick specifications. The main governing factor is really the diameter of the wire rope used. Wire lines of the size now used will not be adequate for deep drilling as contemplated. The drilling-line diameter determines the size of the crown-block sheaves, which in turn determines the size of the water-table opening. With given derrick slope this opening governs the size of the derrick base.

For the 15,000 to 20,000-ft. drilling, as contemplated, one large operator visualizes following requirements for the derrick: height 186 ft. to make possible pulling of fourbles of 30-ft. pipe or thribbles of 45-ft. pipe; capacity 1,200,000 lb.; window opening sufficient to handle 55-ft. kellys; with 1½-in. drilling line used, sheaves would have to be minimum 60 in. in diameter, probably larger; the water-table opening would have to be not less than 8 ft. in the clear. If the slope of the present 136-ft. A.P.I. derrick is retained this would result in a 40-ft. base. Since this base is considered as too large the slope would have to be changed.

"Blanketing" Type Fire Extinguishers

by Henry W. Boggess*

FROM the chart listing the various types of fire extinguishers, showing their compositions, effective ranges and limitations of use (The Oil and Gas Journal, February 8, page 91), it will be noted that two of these agents may be grouped as having more or less exclusive "blanketing" (smothering) qualities, with little or no "cooling" (wetting) effect:

1. Carbon dioxide (CO_2).
2. Dry powder.

Both of these fire-fighting agents are effective on all classes of fire except class "A" (wood, textiles, rubbish, etc.). Each will knock down incipient class "A" fires but smoldering embers are likely to reignite as soon as gases are dissipated and unless water or other cooling agent is also used.

*Superintendent Employment - Insurance Safety, Sinclair Prairie Oil Co.

Both CO_2 and dry powder have characteristics that qualify them as general or all-around fire-fighting agents in that either is transportable, neither is affected by freezing, and both can easily be inspected. Each, however, has shortcomings which should be understood and evaluated before being selected to stand guard for a known fire hazard.

The effective range of CO_2 is the shortest of all agents and constitutes a "fault" where it may be needed to reach fire at a distant point such as overhead line shafts, gear boxes, etc., or at other points where it is impossible for the operator to approach within 8 ft. of the seat of the fire. Because of the shortness of range, CO_2 may also be hazardous on high-voltage electrical fires.

Dry powder is not nearly so limited in effective range but it does leave a residue which may be harmful to electric motors, generators, and certain internal-combustion engines and motors on which it may be used. There are conditions (constant vibration, for instance) which may cause dry powder to "pack" or harden, otherwise its characteristics may be comparable to CO_2 in its effect on fire.

Once having these differences fixed in mind, one other consideration should be given to the value of each from a viewpoint wholly disassociated with their effectiveness on fire: the problem of service and maintenance.

It should be remembered that carbon dioxide is a "pressure" type extinguisher in that CO_2 must be compressed to a liquid state before it can be serviceable as a fire-fighting medium. This means that extinguishers cannot readily be recharged at the point where they may be used. Unless operations justify the expense of special apparatus, CO_2 extinguishers must be sent to the manufacturer or to a liquid-carbonic company for recharging. This means that standby extinguishers must be purchased and stored, else there will be no protection while CO_2 extinguishers are away for recharging. This is not true of dry powder inasmuch as recharging can be quickly and inexpensively done at the point of location and use.

Sun, Houdry Show Work on Carbon 13 to Physicians

Preparation and detection of atomic tracers for use in medical research was demonstrated by scientists of Sun Oil Co. and Houdry Process Corp. before a group of doctors of the American College of Physicians recently in Philadelphia.

The physicians were scheduled for an afternoon tour of Sun Oil's refinery at Marcus Hook and the laboratories of Houdry Process Corp. at Linwood where work has been under way for more than 3 years with the rare isotope, Carbon 13.

Safety Manual Issued

"Accident Prevention Manual for Industrial Operations," a comprehensive treatment of safety fundamentals, is now being issued by the National Safety Council.

REFINING

Improvements Under Way At Wood River Refinery

A Cycloversion unit which will crack 5,000 bbl. of gas oil, desulfurize and reform 8,000 bbl. of straightrun gasoline, or desulfurize, isomerize, and reform 10,000 bbl. of thermally cracked gasoline, is being built by Wood River Oil & Refining Co., Inc., at its Hartford, Ill., refinery.

The unit is scheduled to be completed in July. The company also is increasing its auxiliary tankage, steam-generating capacity, water-cooling facilities, and enlarging its catalytic-polymerization unit, gas-recovery units and propane-manufacturing facilities. Koch Engineering Co., Wichita, Kans., designed the improvements.

The Hartford plant now has a crude capacity of 16,000 bbl. daily.

Expansion Program Under Way in El Paso Refinery

EL PASO, Tex.—A $3,000,000 improvement program is under way at the 14,000-bbl. daily capacity El Paso refinery of Standard Oil Co. of Texas. Ten gasoline storage tanks, a new distillation unit, and a refinery laboratory are scheduled for construction in the program.

Also under construction is a pipe line from Yates field in east Pecos County to Wink, where it will connect with the line which now carries oil from Winkler County to the El Paso refinery.

Gulf Coast Refiners Dissolve Association

HOUSTON. — Offices of the Gulf Coast Refiners Association were closed here last week following a vote of member refineries to cancel the association's charter.

Declining interest and a drop in membership from 12 to 8 member refineries were given as the reason for dissolution. Several refineries have been shut down and others sold since the association reached its membership peak in 1942.

Union Making Alterations On Oleum Coking Unit

Alterations to the coking plant consisting of additions to the distillation end of the unit are now being made at the Oleum refinery of Union Oil Co. of California. The changes will permit around a 25 per cent increase in capacity. The refinery has a listed crude capacity of 45,000 bbl. daily, and a cracking charge capacity of 44,000 bbl. daily.

The company has postponed, because of recent price advances, a project to construct a lubricating-oil plant and compounding unit at its Wilmington refinery.

Both Cracking Processes Necessary, Scientist Says

Thermal cracking as a going concern was given a lease on a long and prosperous history by Dr. A. B. Wilder, or Pure Oil Co.'s scientific staff, before a recent meeting of the Chicago Section of the American Chemical Society.

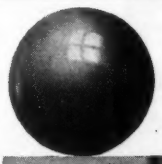
Different hydrocarbons vary widely in their tendency to knock in the spark ignition engine, as operating conditions vary, Wilder said. Thermally cracked hydrocarbon products, rich in unsaturates or olefinic hydrocarbons, show good resistance to knocking at low engine speeds, and therefore their presence in motor fuels is highly desirable for that phase of engine operation. Fuels containing such olefins, especially low-boiling olefins, shows better low-engine-speed performance than an ordinary motor fuel with 2 cc. of tetraethyl lead, Wilder said. The higher-boiling olefins show less knock resistance.

Catalytically cracked fuels are rich in aromatic hydrocarbons and show correspondingly better performance at high engine speeds but are less advantageous at low speeds. Therefore it is most desirable to blend both kinds of fuels to make a balanced gasoline, knock-resistant at all speeds.

No one fuel is best for all types of engines, Wilder pointed out. L-head engines tend to knock worst at high speeds. Valve-in-head engines show more knock at low engine speeds. Thus different types of fuels are needed for different engines.

Nation's Refining Capacity Held Not Overexpanded

Any belief that the nation's refining industry is overexpanded is a "fallacy" when considered in the light of potential future demand, Serge B. Jurenev, secretary and as-



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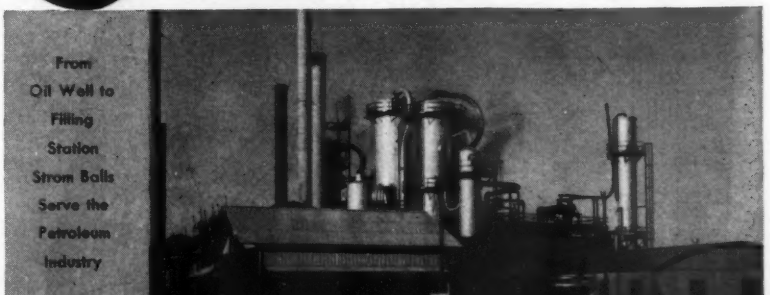

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sistant treasurer of Continental Oil Co., said in a recent talk before the Society of Security Analysts.

The Continental official cited forecasts of the probable growth of the industry's markets and said that, despite wartime construction, catalytic cracking facilities now account for ony about 17 per cent of the total refining capacity. Much old-type equipment will have to be scrapped when a race for higher octane develops, he added.

Jurenev said several other fallacies are frequently encountered in evaluating the industry. Among them are flexibility in refinery yields and high-profit margins on aviation gasoline.

"It is commonly assumed that refining operations are so flexible under new methods that the relationship between various cuts can be established at will," he said. "It is also commonly believed that our gasoline yields went up considerably and that this was particularly so during the war. The reverse is true. In 1939 gasoline yields were about 45 per cent of total refinery runs; in 1943 they dropped to 37 per cent, and came back in 1945 to 41 per cent. What is really happening is that we can produce better gasoline from a barrel of crude rather than more gasoline.

"As yet, aviation gasoline consumption is small compared to the annual consumption of automotive gasoline. It is our understanding that the servicing of airports is usually carried on at a loss considering the transportation difficulties and the necessity of maintaining special storage and proper delivery service."

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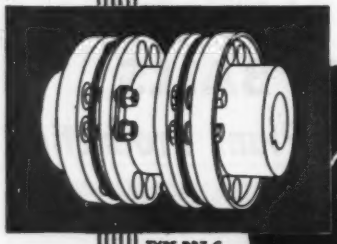

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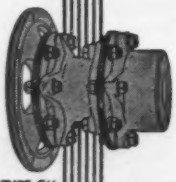

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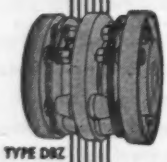

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Shell Plant to Produce Synthetic Ethyl Alcohol

HOUSTON. — Synthetic ethyl alcohol will be produced from refinery waste gases in the new Shell Chemical plant on the Houston ship channel more cheaply than it can be produced from grain, according to an announcement in Houston by Shell officials. The new plant, being built at a cost of $3,200,000, is scheduled for completion by October.

Shell officials said annual output will be about 18,000,000 gal. The new plant, utilizing only waste products, will not tend to reduce the output of any other petroleum products, they added.

Monsanto Plans Early Polystyrene Production

Manufacture of polystyrene plastic will get under way within the next few months in the Texas City, Tex., plant of Monsanto Chemical Co., company officials announced recently The plant was purchased from War Assets Administration for $9,550,000 last August after the company had operated it for the Government during the war. It will be the nucleus of Monsanto's planned expansion.

Construction of additional units at other Texas cities also is planned, the company said. A Texas division with headquarters at Texas City will be established, with Joseph R. Mares as general manager.

Stoll Refining Plans New River Terminal

Construction is scheduled to get under way soon by Stoll Oil Refining Co. of a new terminal on the Ohio River and adjacent to the Illinois Central railroad at West Point, Ky.

Construction has been delayed by a suit in which adjoining land owners attempted to prevent purchase of the terminal site through a zoning ordinance, a suit won by the company last week.

The company plans to build four 25,000-bbl. floating-roof tanks and one kerosene tank, according to Berry V. Stoll, vice president.

Restrictions on Butyl Lifted

Butyl rubber may now be used in the manufacture of tire tubes of all sizes and types, the Civilian Production Administration has announced.

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PIPE LINES

Connecticut Products Pipe Line Planned

NEW YORK. — Authorization is being sought from the Connecticut Legislature by the newly organized Connecticut Pipe Line Corp. for construction of a 40-mile, 8-in. products line from New Haven to Hartford.

The proposed line is expected to move 7,000,000 bbl. yearly of gasoline, kerosene and light fuel oils. The terminal to be built in New Haven would provide docking facilities for large oil tankers which now unload at New York and Philadelphia. At New Haven there will be a pump station in addition to the unloading and docking facilities. The construction of additional petroleum terminal projects for New Haven already has been planned.

Pipe-line sources estimate that the lowered transportation costs will reflect a yearly $500,000 saving to the public.

Officials of the projected pipe line are: T. A. D. Jones, board chairman who currently operates a coal and residual-fuel oil terminal in New Haven; William C. Eberle, president a former assistant to general manager of Atlantic Refining Co.'s transportation division and transportation division director of Petroleum Administration for War's District 1; and Ned F. Foulds, vice president, who is also president of Foulds Trading Co. and former PAW fuel-oil-section chief in Washington, Chicago, and New York. Edwin C. Blair, formerly with the legal division of Standard Oil Co. (N. J.) and now a principal partner in Blair & Ogden, corporation attorneys, is secretary-treasurer. F. E. Warterfield, Jr., president, Oklahoma Engineering Co., Dallas, who designed the Plantation pipe line, is the designer and consultant.

This will be the only oil pipe line wholly within the State of Connecticut.

T.G.&T. Prepares For 26-In. Loop

Tennessee Gas & Transmission Co. will award contracts late this month for a 20-mile, 26-in. loop near Holley in northern Mississippi on its main transmission line. Pipe is being received in quantities which indicate that sufficient pipe will be on hand for undertakng laying operations.

All of the pipe has arrived for the 98-mile, 16-in. extension in the San Salvador, Tex., area where construction is getting under way which has been contracted by Associated Contractors & Engineers.

During the operation of the Inch lines leased from the federal Government until April 30 by T.G.&T. for delivering gas from Texas to Ohio Valley and Pennsylvania points, the largest throughputs have been in the 135-140,000,000-cu. ft. range. Gas movements have been impeded by the presence of water and hydrates in the lines. However, an effort is being made to increase throughput which may result in delivering larger volumes in the next few weeks.

A leak occurred in the T.G.&T.'s main 24-in. line in West Virginia last week. This is referred to as a leak rather than a break; it resulted from a crack at a wrinkle bend which was repaired within 6 hours.

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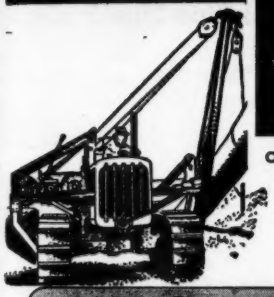

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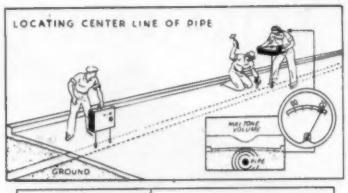

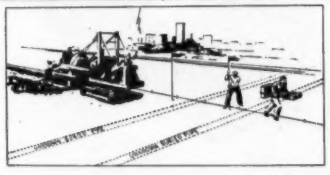

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Skelly Pressure Welds 45 Miles of 8-In.

Skelly Pipe Line Co. is laying 45 miles of 8-in. in Kansas for which it is using pressure welding, according to Rex L. Smith, assistant manager of pipe line and crude-oil purchasing. H. V. Knupp Construction Co. is completing 15 miles of 8-in. east of Hutchinson; M. E. White Construction Co. is laying 30 miles of 8-in. near McPherson, Kans. Skelly has adopted pressure welding for lines of this type as the result of successful experience with 4½ miles of 6-in. operated since last year at 750-psi. pressure.

In the laying of lines in the current construction program, pressure welding has been subjected to severe tests, one of them being the dropping of welded sections from a height of 10 ft.

Near Velma, Okla., Skelly has completed 30 miles of pipe ranging from 2-in. to 6-in. in diameter; this system feeds into the lines of Interstate Oil Pipe Line Co. at Tussy, Okla. Work has been contracted by J. Carlson & Son.

Arkansas Fuel to Let Terminal Contracts

Arkansas Fuel Co. (Cities Service) has received bids for five terminals to be located along the Plantation Pipe Line Co. system at points near Meridian, Miss., Birmingham, Ala., Knoxville, Tenn., Spartanburg, S. C., and Charlotte, N. C. These terminals will serve to receive and deliver shipments of refined products transported through the Plantation line.

Pennsylvania Abandons Fight on Pipe-Line Sale

HARRISBURG, Pa.—The Pennsylvania General Assembly has abandoned as "futile" an effort to have Congress delay sale of the $146,000,000 Big Inch and Little Big Inch pipe lines for 6 months.

The senate mines and mining committee dropped consideration of a resolution to memorialize Congress for the delay after learning a congressional committee at Washington already had refused to recommend postponement of the sale of the government war-built lines.

Pipe-Line Flow of Motor Fuel Above 1945 Figure

The amount of motor fuel delivered from pipe lines in November showed a 29.9 per cent increase over the same month of 1945, while registering a 4 per cent drop in daily average flow from October.

In November a total of 19,176,000

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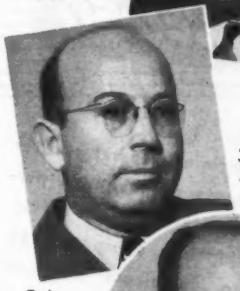

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bbl. was delivered, compared with 20,710,000 bbl. in October and 15,857,000 bbl. in November of 1945.

Great Lakes Completing Ponca City Branch Line

Great Lakes Pipe Line Co. is completing a 54-mile, 8-in. line from Ponca City to Barnsdall, Okla., contracted by A. C. Holder Construction Co. This contractor will take up 24 miles of 6-in. between Turley and Barnsdall, Okla., which will be culled, reconditioned, and stockpiled for Great Lakes.

At Ponca City the Great Lakes company is installing a single supercharged 810-hp. Alco diesel engine driving a Byron-Jackson centrifugal pump. This unit will replace two diesel-driven reciprocating-pump units.

Early this week 28 miles 8-in. had been laid between West Tulsa and Drumright, Okla., in the building of lines in connection with the Great Lakes program to serve Sunray Oil Co. and Wilcox Oil Co. Williams Brothers Corp., the contractor, has a spread working toward Drumright and is starting a second spread from Allen, Okla.

New Techniques Used in West Coast Fabrication

The process employed in the fabrication of the 30-in. pipe for the California section of the Texas-Los Angeles natural-gas line, is attracting widespread interest in the pipe-line industry.

Employed for the first time on the West Coast, the process involves continuous welding of the longitudinal seams and hydraulic expansion of the welded sections. The pipe, being produced at the rate of more than 9 miles weekly in the Maywood plant of Consolidated Steel Corp., has a minimum yield strength of 52,000 psi. and is the largest diameter pipe of this quality yet made.

Plates of special manganese steel approximately 92 in. wide and 30 ft. long are passed on a conveyor through leveling rolls, which remove any waves or buckles, and a shear, which trims the ends square and to proper length; past grit-blasters, to remove mill scale from the edges to be welded; planers, which reduce the plates to exact width and squareness and properly prepare both edges for welding.

The plates then are conveyed to the edge roll, which forms both edges to the proper radius, and thence to one of the pyramid rolls, in which the plates are rolled to cylindrical shape.

Upon leaving the roll, the cylinders are fed end to end through the seam welders in which the abutting edges are properly aligned and welded by the submerged-arc process.

The cylinders are made somewhat smaller in diameter than the finished diameter of 30 in. In the next operation the ends of the cylinders are mechanically stretched in end expanders to 30 in. diameter, after which the cylinders are rolled into one of the hydraulic expanders.

Denver Franchise Expedites Proposed Pipe Line Project

Colorado Interstate Gas Co.'s 260-mile 20-in. natural-gas pipe-line project is nearer materializing as the result of a 20-year franchise recently authorized by the voters of Denver, Colo. Subject to the issuance of a Federal Power Commission permit, the construction of this project and gathering line will commence in May.

Texas Pipe Line Considers Extension

Texas Pipe Line Co. is reported to be considering a proposed extension of its system to be effected by the possible laying of 17 miles of 6-in. from Maysville, Okla., to the company's Apache-Seminole, Okla., crude oil line. Early this week proposals for the work had not been received by contractors.

EXCEL-SO

The original separator/filter guarantees maximum performance with minimum servicing of pipeline equipment by delivering petroleum products 99.999% water free while eliminating debris and microscopic iron solids from product streams.

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FORGED STEEL VALVE

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Export Representative: Jones & Laughlin Supply Co., 230 Park Ave., New York 17, N. Y.

TULSA 1, OKLAHOMA

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 15, 1947

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1947				
	Comp.	Oil	Gas	Dry	Footage	1947	1946	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	25	12	0	13	40,012	191	197	0	0	0	0	0	0	0	0	0	0
Pennsylvania	62	31	7	†24	94,242	435	592	0	0	0	0	0	0	0	0	0	0
West Virginia	29	2	22	5	93,825	117	76	0	0	0	0	0	0	0	0	0	0
Ohio	21	4	10	7	70,810	170	137	0	0	0	0	0	0	0	1	5	6
Indiana	4	3	0	1	8,684	52	38	0	0	0	1	1	1	0	0	4	5
Kentucky	5	1	3	1	6,481	49	57	0	0	0	0	0	0	0	0	6	6
Illinois	30	19	0	11	74,439	242	254	1	0	0	6	7	9	0	0	43	52
Michigan	6	2	1	3	12,675	92	88	0	0	1	2	3	0	0	3	35	38
Kansas	42	25	7	‡10	138,762	339	293	2	0	0	3	5	8	0	3	35	46
Neb., Mo., Iowa	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1
Oklahoma	98	46	4	48	317,725	527	314	4	0	0	38	42	13	0	1	106	120
Texas	170	101	15	54	745,220	983	1,009	6	0	6	23	35	32	5	12	152	201
North Central	64	34	2	28	200,596	316	346	2	0	2	8	12	13	0	4	55	72
West	36	29	1	6	184,758	246	213	0	0	0	4	4	1	0	1	23	25
Panhandle	2	2	0	0	12,876	49	50	1	0	0	0	1	1	0	0	1	2
Eastern	19	4	2	13	85,583	66	95	0	0	0	8	8	1	0	0	16	17
Gulf Coast	25	15	7	3	152,351	207	248	1	0	4	1	6	11	5	6	29	51
Southwest	24	17	3	4	109,056	99	57	2	0	0	2	4	5	0	1	28	34
Louisiana	23	13	2	8	137,335	153	152	0	0	0	4	4	6	3	0	22	31
Northern	15	8	2	5	62,733	73	79	0	0	0	2	2	0	0	0	13	13
Southern	8	5	0	3	74,602	80	73	0	0	0	2	2	6	3	0	9	18
Arkansas	9	4	1	4	34,950	30	21	0	0	0	2	2	0	0	0	6	6
Mississippi	5	3	0	2	44,780	48	30	0	0	0	2	2	0	0	1	15	16
Southeastern States	3	1	0	2	9,810	8	8	0	0	0	2	2	0	0	0	7	7
Montana	1	0	1	0	1,015	23	32	0	0	0	0	0	0	0	0	4	4
Wyoming	0	0	0	0	0	27	23	0	0	0	0	0	2	0	1	7	10
Colorado-Utah	2	1	0	1	3,542	21	16	1	0	0	1	2	1	0	0	4	5
New Mexico	12	6	3	3	56,678	63	56	0	0	0	2	2	1	0	0	8	9
California	47	39	0	8	179,967	262	246	0	0	0	6	6	2	0	0	39	41
Total United States	594	313	76	205	2,070,952	3,833	3,640	14	0	7	92	113	75	8	22	499	604
Total previous week	517	266	62	189	1,894,414	3,239	3,068	9	5	4	67	85	61	8	15	407	491
Total Feb. 16, 1946	472	262	46	164	1,650,467			10	0	3	55	68	51	1	17	421	490

Service wells included: *13, †23, ‡1.

MARKET QUOTATIONS

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.17	....	....	....
19-19.9	1.21	....	....	....
20-20.9	1.24	$1.30	....	$1.17
21-21.9	1.28	1.32	....	1.19
22-22.9	1.32	1.34	....	1.21
23-23.9	1.35	1.36	....	1.23
24-24.9	1.39	1.38	$1.61	1.25
25-25.9	1.43	1.40	1.63	1.27
26-26.9	1.46	1.42	1.65	1.29
27-27.9	1.50	1.44	1.67	1.31
28-28.9	1.54	1.46	1.69	1.33
29-29.9	1.57	1.48	1.71	1.35
30-30.9	1.61	1.50	1.73	1.37
31-31.9	....	1.52	1.75	1.39
32-32.9	....	1.54	1.77	1.41
33-33.9	....	1.56	1.79	1.43
34-34.9	....	1.58	1.81	1.45
35-35.9	....	1.60	1.83	1.47
36-36.9	....	1.62	1.85	1.49
37-37.9	....	1.64	1.87	1.51
38-38.9	....	1.66	1.89	1.53
39-39.9	....	1.68	1.91	1.55
40 and above	....	1.70	1.93	1.57

*For crude from Daboval, El Campo, and Sandy Point. †Includes Lea County, New Mexico.

(Quotations shown here are f.o.b. plant in tank cars and in cents per gal. as of last Monday.

REFINERY GASOLINE

Octane (A.S.T.M.)	78-80†	73-75
Mid-Continent*	7.375-7.625	6.750-7.000
Tex. Gulf Coast	7.50-7.75	6.750-7.125
New York Harbor	9-10.75	8-9.25

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades—	26-70	18-55
Oklahoma (Group 3)	5.125	6.150
N. Texas (f.o.b. plant)	4.625	5.550
N. Louisiana (f.o.b. plant)	4.875	5.850

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.70
Kettleman Hills, California*	1.69
Beauregard Parish	1.65
Illinois Basin	1.82
Pecos County, Texas (Yates)	1.40
Bradford, Pennsylvania	3.65
Eastern Ill., and Western Ind.	1.67
Tomball, Texas Gulf Coast	1.85

Note: Crude prices exclusive of subsidy.

A.P.I. REFINERY REPORT

Week ended February 8, 1947

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Distillate	Residual
East Coast	714	21,725	16,447	7,180
Appalachian	170	3,690	533	372
Ill., Ind., Ky.	774	20,063	3,842	2,830
Okla., Kan., Mo.	390	10,116	1,657	1,182
Inland Texas	215	4,103	347	729
Tex. Gulf Cst.	1,145	15,371	7,888	5,765
La. Gulf Cst.	362	5,573	2,724	1,763
N. La., Ark.	63	2,234	494	117
Rocky Mtn.	142	2,693	481	638
California	810	16,137	10,680	26,961
Total 2-8-47	4,785	101,705	45,093	47,537
Total 2-1-47	4,783	100,579	48,131	47,947
Total 2-9-46	4,529	103,853	28,351	34,966

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
February 8, 1947	220,313,000
February 1, 1947	223,737,000
February 9, 1946	223,303,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 15 crude oil	B. of M. Feb. demand	Feb. 8 crude oil
Alabama	1,000	1,200	1,050
Arkansas	80,100	76,000	80,300
California	898,500	838,000	885,800
Colorado	38,500	33,000	37,650
Eastern	56,500	64,200	68,500
Florida	240	200	245
Illinois	186,900	204,000	197,800
Indiana	17,400	18,000	19,900
Kansas	260,650	263,000	276,500
Kentucky	27,000	28,000	28,400
Louisiana	412,700	387,000	412,100
North Louisiana	102,400	.....	101,800
South Louisiana	310,300	.....	310,300
Michigan	39,380	46,000	42,695
Mississippi	86,035	66,000	90,035
Montana	23,920	23,000	20,710
Nebraska	700	800	700
New Mexico	103,400	98,000	103,400
Oklahoma	370,150	370,000	367,950
Texas	2,056,665	2,030,000	2,056,665
District 1 (Southwest)	19,950	.....	19,950
District 2 (Southwest)	146,025	.....	146,025
District 4 (Southwest)	223,250	.....	223,250
District 3 (Gulf Coast)	451,000	.....	451,000
District 5 (Eastern)	36,440	.....	36,440
District 6 (Eastern)	106,100	.....	106,100
East Texas field	328,200	.....	328,200
District 7C (West)	32,665	.....	32,665
District 8 (West)	467,455	.....	467,455
District 7B (W. Central)	36,100	.....	36,100
District 9 (N. Central)	126,355	.....	126,355
District 10 (Panhandle)	83,125	.....	83,125
Wyoming	104,860	93,000	101,370
Miscellaneous	.....	600	.....
Total United States	*4,764,600	4,640,000	4,791,770
Change from prev. wk., down	27,170		

Total production January 1-February 15..... †216,546,030 bbl.
Same period last year (crude plus condensate).. 220,820,320 bbl.
*Not incl. 26,420 bbl. condensate. †Incl. 1,178,200 bbl. condensate.

CRUDE-OIL STOCKS 220,313,000 bbl. as of February 8—down 3,424,000 bbl. One year ago 223,303,000 bbl.

GASOLINE STOCKS 101,705,000 bbl. as of February 8—up 1,126,000 bbl. One year ago 103,853,000 bbl.

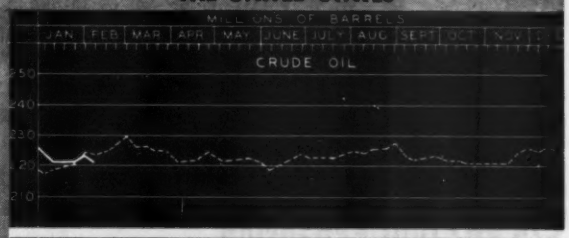
RESIDUAL FUEL-OIL STOCKS 47,537,000 bbl. as of February 8—down 410,000 bbl. One year ago 34,966,000 bbl.

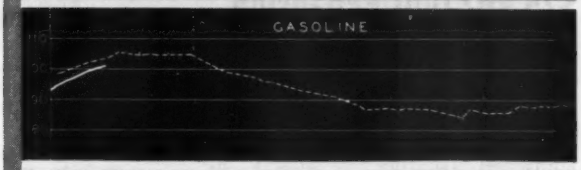
GAS OIL AND DISTILLATE STOCKS 45,093,000 bbl. as of February 8—down 3,038,000 bbl. One year ago 28,351,000 bbl.

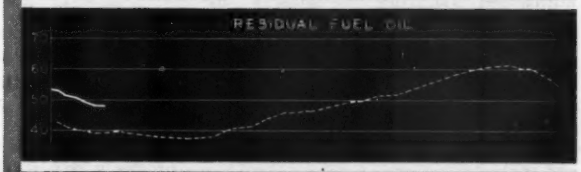
CRUDE-OIL PRODUCTION 4,764,600 bbl. as of February 15—down 27,170 bbl. One year ago 4,694,340 bbl.

REFINERY RUNS 4,785,000 bbl. daily week ended February 8—up 2,000 bbl. One year ago 4,529,000 bbl.

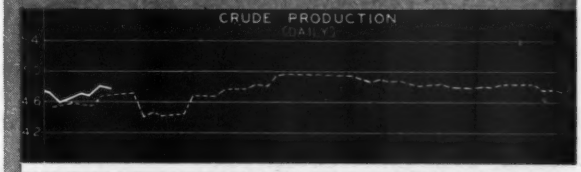
OIL STOCKS IN THE UNITED STATES

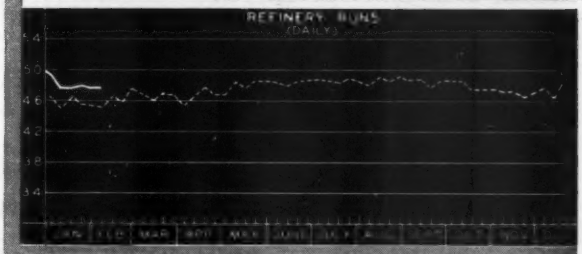






DAILY OPERATIONS





Solid line charts weekly completions, service wells in Eastern area included.

NATURAL GAS

Columbia Groups Plan $25,492,000 Expansion

WASHINGTON.—Columbia Gas & Electric Corp.'s Charleston and Pittsburgh groups have filed with the Federal Power Commission applications for authority to construct additional facilities to supply increased requirements in existing markets served by the Columbia companies, including Washington Gas Light Co. Manufacturers Light & Heat Co., and Home Gas Co. Total cost of the proposed facilities has been estimated by the companies at $25,492,040.

Plans include construction by Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., members of the Charleston Group, of a 268-mile, 24-in. line from United Fuel Gas Co.'s Cobb, W. Va., compressor station to a connection with the existing mainline system of the two companies near Rockville, Md., and construction by Manufacturers Light & Heat Co. and Home Gas of a 130-mile, 14-in. line from a junction of the main line of Manufacturers Light & Heat at Coatesville, Pa., to Port Jervis, N. Y. This line would extend through eastern Pennsylvania to a point of connection with the eastern portion of Home Gas Co.'s transmission system.

In addition, Atlantic proposes construction of a new 3,200-hp. compressor station on its main line in the vicinity of Flat Top, W. Va., a Potomac River crossing and installation of measuring and regulating equipment. Virginia Transmission would install two additional 800-hp. compressor units at its Bickers station in Albemarle County, Virginia.

Other proposals of the Pittsburgh group include the installation by Manufacturers of compressors aggregating 3,174 hp., the purchase of 10½ miles of 8-in. transmission line in Ohio from Natural Gas Co. of West Virginia, construction of 1,400 ft. of 12-in. transmission line in Washington County, Pennsylvania, and Marshall County, West Virginia, connecting the Majorville compressor station and United Fuel's Cedarville line, the purchase of 7,300 ft. of the Cedarville line from United Fuel, and construction of 3.2 miles of 20-in. line near Groveton, Pa., connecting a 20-in. line with a 16-in. line. Natural Gas of West Virginia would install an aggregate of 1,000 hp. in Ohio compressor stations.

Ohio, United Fuel Gas Propose 100-Mile Line

WASHINGTON.—United Fuel Gas Co. and Ohio Fuel Gas Co. have requested authority from the Federal Power Commission to construct a 100-mile, 20-in. gas-transmission line extending from a tap on the line of Tennessee Gas & Transmission Co. near Ceredo, W. Va., to Ohio Fuel's Crawford compressor station in Fairfield County, Ohio.

Upon completion of the line and other facilities required, the companies state they would be able to deliver an additional 51,000,000 cu. ft. of gas a day to the Crawford station to meet increased demands of Ohio Fuel's present markets. Construction costs to both companies have been estimated at $4,398,620.

The portion of the line extending from T. G. & T.'s Ceredo tap to Burlington, Ohio, would be constructed by United. Ohio Fuel would construct the Ohio portion of the line and also install two 600-hp. compressor units in its South Point compressor station, through which the line would be routed. After completion of the entire project, the Lick compressor station and about 191 miles of smaller line between the South Point and Crawford stations would be abandoned. United Fuel and Ohio Fuel are both subsidiaries of Columbia Gas & Electric Corp.

Phillips Appeals Order Fixing Natural-Gas Price

OKLAHOMA CITY.—Phillips Petroleum Co. last week appealed to the State Supreme Court to nullify the Oklahoma Corporation Commission's order fixing the price of natural gas in the Guymon-Hugoton field at 7 cents per 1,000 cu. ft.

Phillips recently was denied by the commission an application seeking exception to the order. Cities Service Gas Co. already has filed its appeal with the court. Cities Service Gas was the defendant in the original case filed by Peerless Oil & Gas Co. which resulted in the price order.

Michigan Consolidated Will Expand Facilities

Michigan Consolidated Gas Co. will spend about $12,000,000 in 1947 to increase and improve its distribution facilities, according to the firm's annual report, announced by William G. Woolfolk, chairman.

The expansion program will include a $2,000,000 addition to the Detroit gas-manufacturing plant, $8,000,000 for new mains and service expansion, and $2,000,000 for expansion of facilities in other cities.

Woolfolk said an increase of 19 per cent in gas consumption last year forced the company to supplement its natural-gas supply with 1,000,000,000 cu. ft. of manufactured gas and conduct an advertising campaign urging gas conservation.

Panhandle Eastern Boosts Reserves in Hugoton Field

Panhandle Eastern Pipe Line Co. during 1946 increased its gas reserves in Hugoton field to an estimated 6 trillion cubic feet, an increase of 18 per cent for the year, through outright purchase of gas acreage or through control of leases.

The company also developed a new gas field in Michigan with reserves estimated at more than 50 billion cubic feet. Installation of new facilities during 1947 and 1948 are expected to increase the capacity of the company's transmission system to approximately 180 billion cubic feet annually.

Natural Gasoline

Automatic Process Control Discussed Before C.N.G.A.

Problems involved in the successful application of automatic process controls were discussed by E. H. Reynods, Richfield Oil Corp., at the February meeting of the California Natural Gasoline Association.

Rapid and accurate measurement of the variables and rapid and precise application of corrective measures can be solved by proper selection of control instruments, he said. The third problem, that of proper selection of variables to be controlled, requires a study of the process and consideration of the products desired. William Troutman and Gordon Lawn, also of Richfield, collaborated in the paper Reynolds presented. Heat-transmission problems of the petroleum industry will be discussed March 6 by Dr. L. M. K. Boelter, dean of the University of California (Los Angeles) college of engineering, before a joint meeting of the C.N.G.A. and the American Society of Mechanical Engineers.

Exploration and Drilling

Important Canadian Discovery

SHOWING prospects of opening one of the most important fields in Western Canada since the Turner Valley field, Imperial-Leduc No. 1, LSD 5, 22-50-6w4, blew into production while drilling out plug late last week and sprayed the 158-ft. derrick with oil. Officials of the company have since announced the completion of the well, and an official statement by Walker Taylor, western production manager of Imperial Oil, said: "It has excellent prospects. When we acidize, it may show indications of being considerably better. It has the best possibilities of any well we have drilled in Western Canada outside of Turner Valley." On initial production tests, the well flowed at the rate of approximately 40 bbl. per hour from a porous zone at 5,029-66 ft. Production for the 24-hour period ending Saturday, Feb. 17, was 424 bbl., although company officials believe this might have been somewhat higher if transportation facilities and greater storage space had been available. Tests are now being made to determine the most efficient rate of flow.

Production at the Leduc No. 1 is coming from the Devonian limestone in which the well is now bottomed at 5,066 ft. After encountering a porous zone in that formation, the well was cored ahead a few feet into the zone and encountered light brown crude oil under substantial pressure. Oil is said to have filled the pipe in 1½ hours and then flowed briefly by heads through the drill stem. Another test was run after deepening further into the zone and was said to have resulted in a 1,080-ft. rise in 1 hour. Operators then cored ahead to the present depth to make the final drill-stem test. Results of this test showed a 4,100-ft. rise of oil in 1 hour with no water indicated. A production string of 7-in. casing was then set in order to make conclusive production tests.

The Leduc No. 1 is located approximately 20 miles south of Edmonton, and is the first encouraging well drilled in the Alberta syncline, a great trough flanking the Rocky Mountains to the east. It is the first well in the northern plains area in which drilling has been carried to the Devonian. Production of oil and gas in east-central Alberta areas has heretofore come from Cretaceous formations just above or below 2,000 ft. The area is 174 miles north of Calgary and some 200 miles northwest of the Steveville-Princess field, where some production has been found in the Devonian at shallower depths. (The crude from the Leduc well is said to be very similar to that produced in the Steveville-Princess field).

While the results at the Leduc well indicate an important discovery, further production tests of the well and considerable further development in the area are necessary before the strike can be evaluated accurately. On the basis of a gas flow and oil showings in the 4,000 to 4,400-ft. range, Imperial had staked location for the Leduc No. 2 in LSD 1, 16-50-26w4, prior to drilling the Devonian at the No. 1. This new test is now spudding.

Several large acreage reservations have been taken in the area, Imperial holding a reservation on 523,000 acres in the Leduc area extending north to the south limits of Edmonton, and another 500,000 acres west of Edmonton extending to Whitecourt. Gulf Oil Co. has taken a reservation on 1,000,000 acres in the Edmonton area.

MICHIGAN

Large Producer Added In Roscommon Field

SAGINAW.—A new producer in the Roscommon field which flowed 240 bbl. a day after acid and a new development in the Clayton field of Arenac County marked meager Michigan oil field activity in the past week. Six completions were reported, two oil wells, one a trifling gas well, classed as a wildcat in Zeeland Township, Ottawa County, and three dry holes, two of them wildcats.

The Roscommon completion is the Eugene Hilliard 1-H in Section 33. McClanahan Oil Co. reported 102 bbl. on 18 hour test in its Buffalo Land 5 in Clayton, the well coming in on the 10th anniversary of McClanahan's first well in the field.

Charles W. Teater, Saginaw independent, outbid Ohio Oil Co., paying $51,000 for a lease of acreage owned by the village of Lakeview, Montcalm County. Teater said the lease includes 17 acres, plus riparian rights on about 80 acres of lake bottom and right to drain oil from under a cemetery of which the acreage he leased is an undeveloped portion. A 200-bbl. oil producer nearby caused the brisk demand for lease rights.

Only four new locations were announced, two in Oceana County, one in Kent, the other in Lapeer.

MICHIGAN SUCCESSFUL WILDCAT

Ottawa County, Zeeland Township: Tri-County Development Co. 1 Myer-Trost Communitized, C SE NW 12-5n-14w, gas well, 15,000 cu. ft., TD 990 ft.

MICHIGAN WILDCAT FAILURES

Kent County, Byron Township: Rex Oil & Gas Co. 1 C. Buddingh, Jr., NW SE SE 28-5n-12w, dry in Traverse lime, TD 1,773 ft.

Lake County, Ellsworth Township: Sohio Petroleum Co. 1 Charles A. Wilson, NE SW NE 20-19n-11w, dry in Detroit River, TD 3,599 ft.

SOUTHWEST TEXAS

Zavalla County Gets First Commercial Oil Production

CORPUS CHRISTI.—The first commercial oil producer for Zavala County has been completed by Texas Co. at its 1 Cross S. Ranch Co., Tract 2, in the Pedro Jose de Aguirre Grant, 6 miles northwest of Crystal City. Drilled to a total depth of 3,334 ft., it flowed a potential gage of 73 bbl. of 25.9°-gravity oil per day through a 3/16-in. choke, tubing pressure 475 lb., casing 640 lb., no water in the flow. The first test in this area, Texas Co. 1 Northeast Farming Co., cored and tested oil in this sand, but it has not been completed and the Cross S. Ranch well will probably be listed as the discovery for this field. Production is from open hole at 3,304-34 ft. Operators are preparing to move in on 2 Northeast Farming Co., in Section 44, located 1,320 ft. west of the 1 Cross S. Ranch.

A new producing area has been opened by Atlantic Refining Co. 1 H. F. McGill et al, first commercial oil producer, in Kenedy County, just south of the Kleberg County line. It was drilled to a depth of 9,905 ft., with 9⅝-in. casing set to 7,998 ft., and 5½-in. at 9,904 ft. Production test below 8,000 ft. failed, and the 5½-in. pipe was pulled. Perforations were made in the 9⅝-in. casing at 7,676-80 ft. and the well flowed at the rate of 279 bbl. per day with 700 lb. working pressure, making 5 to 35 per cent basic sediment and water. These holes were squeezed and operators perforated at 7,676-80 ft. for completion. This well is in the Santa Rosa de Arriba Grant.

F. M. Boykin, Jr. 5 C. V. Jones is the old 1 Jones dry hole which has been worked over and is now a good oil producer and extension of production in the 5,680-ft. pay for Midway field, San Patricio County. Boykin reworked this well, set 5½-in. casing to 5,705 ft., and perforated at 5,682-84 ft., flowing potential gage of 130 bbl. of oil per day through a ½-in. choke, tubing pressure 960 lb., casing 1,225 lb., with no water in the flow. This well is located in Section 72 of George H. Paul

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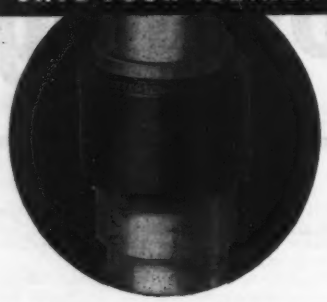

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subdivision, and is the third abandoned hole which Boykin has reworked in this area to bring in oil production from the new 5,100-ft. and 5,680-ft. sands.

The 25 new locations reported included 8 wildcat starts, 1 each in Atascosa, Brooks, Duval, McMullen, Webb, Willacy, Zapata and Zavala counties. One new pay in Jim Wells County, West Magnolia City field, and the new Del Monte oil pool in Zavala County were completed. Two dry wildcats, one each in McMullen and Williamson counties, were completed.

SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Jim Wells County: New oil pay, West Magnolia City field—Ralph E. Fair, Inc. & Jack Woodward, Inc. 4-B Reynolds & Richardson, W. N. Staples Sur. 210, Lot 24, Chas. Seefeld Farm lots, TD 5,834 ft., top pay 4,939 ft., perf. 4,938-42 ft., IP 122 bbl. oil per day through 11/64-in. choke, gas-oil ratio 295, TP 280 lb., CP 1,380 lb., gravity 30.5°, no water.

Zavala County: New oil pool, Del Monte—Texas Co. 1 Cross S. Ranch Co., Blk. 42, Sec. 43, Cross S. Ranch Subd., Pedro Jose de Aguirre Grant, 6 mi. NW of Crystal City, TD 3,334 ft., top pay 3,304 ft., open hole 3,303-34 ft., IP 73 bbl. oil per day through 3/16-in. choke, TP 475 lb., CP 640 lb., gravity 25.9°, no water.

SOUTHWEST TEXAS WILDCAT FAILURES

McMullen County: W. W. Hawkins 1 Nueces Land & Livestock Co., in John T. Morehead Sur. 235, 5 mi. N of Munson field, in SW cor. of county, dry, TD 1,802 ft.

Williamson County: A. J. Maresh 2 Frank Hejl, in Hardy Pace Sur., 7 mi. SE of Taylor, dry, TD 1,049 ft.

N. CENTRAL TEXAS

New Mississippi Lime Pool Found in Throckmorton Co.

WICHITA FALLS.—A new Mississippian limestone pool for Throckmorton County was reported last week. It is Fred M. Manning, Inc. 1 James R. Record, in Section 1,609, TE&L Survey, 5 miles northwest of Woodson. A drill-stem test in the limestone at 4,665-4,700 ft., open 30 minutes, flowed oil in 14 minutes and recovered 4,000 ft. of 43°-gravity oil. Bottom-hole pressure rose to 2,250 lb. in 15 minutes. The flow of oil was not gaged but operators estimated it to be at the rate of 60 bbl. an hour. The Caddo and Strawn zones also were said to have shown commercial possibilities.

In Archer County, 4 miles south of Dundee, W. T. Graham 1 A. L. Harris, Block 3, Hooper & Wade Survey, had a showing of oil in the Caddo limestone topped at 4,949 ft. On drill-stem test at 4,942-82 ft., it recovered 72 ft. of oil and gas-cut mud. Operators were drilling ahead below 5,096 ft. in shale and lime.

Two Jack County wildcats were showing for new production in Caddo limestone. Deep Rock Oil Corp. 1 R. Thomas, in the W. L. Argo Survey, 3 miles northwest of Perrin, reported a show of oil at 5,131-64 ft., took a drill-stem test at that interval but results were not available on last report. Six miles east of Bryson, A. R. Dillard 1 J. H. Marley had showings of oil at 4,835-50 ft. and was drilling ahead still in the Caddo.

In Foard County, 6 miles southeast of Crowell, Stanolind Oil & Gas Co. 1 J. G. Halsell flowed 46 bbl. of oil in 9 hours to open a new Strawn limestone pool. Casing was perforated between 4,822-38 ft., and oil started flowing after a 400-gal. acid treatment. Completion potential tests were being made. The test had total depth at 5,912 ft., in the Ellenburger topped at 5,897 ft., and which carried salt water. Operators said this pay correlated with the same zone in the Bateman Ranch field of King County.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: L. Raymond Dawson, Jr. 1 L. F. Wilson, ATNCL Sur., 10 mi. NW Archer City, dry, TD 1,540 ft. in shale.

Grayson County: Seitz, Comegys & Seitz 1 A. C. Jamison, Asa Hartsfield Sur., 2½ mi. S Whitesboro, dry, TD 5,495 ft. in lime and shale, sand with slight show of oil 2,245-52 ft., DST recovered 11 ft. drilling mud, bottom-hole pressure 700 lb. in 10 minutes.

Jack County: Warren Oil Corp. 1 Laura Gaag, T. Kane Sur., 3½ mi. SW Jacksboro, dry, TD 6,145 ft., Palo Pinto 1,006 ft., Caddo 4,580 ft., Ellenburger 5,735 ft., elev. 1,228 ft.

Wichita County: Fain & McGaha 1 W. E. and A. B. Huff, Blk. 20, DCSL Sur., 4 mi. NE Holliday, dry, TD 4,565 ft. in sandy shale.

Wilbarger County: J. E. Trigg 1 W. I. Stephens, John Collingsworth Sur. 810, A-14, 3 mi. NE Oklaunion, dry, TD 7,587 ft., tight hole, no tops reported.

Frank Wood et al R. L. Castlebury, Sec. 100, Blk. 14, H&TC Sur., 6 mi. SE Lockett, dry, TD 2,653 ft. in shale and lime streaks.

WEST CENTRAL TEXAS SUCCESSFUL WILDCATS

Brown County: Extension—Central Texas Gas Co. 1 Frank Madison, S. Ingram Sur. 154, 6 mi. SE Bangs, flowed 57 bbl. 40.5°-gravity oil a day through ¾-in. choke, Marble Falls, 2,758-85 ft., TD, casing pressure 107 lb., tubing pressure 55 lb., acidized with 2,000 gal.

Comanche County: Riley & Messer 1 R. M. Richburg, NW cor. of county, Sec. 36,

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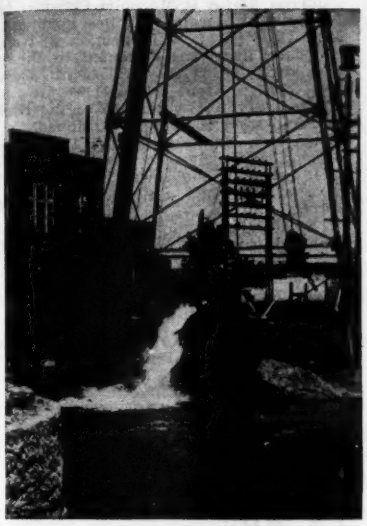

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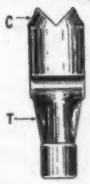

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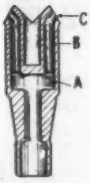

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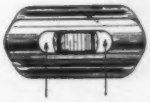

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D&DA Sur., flowed 50,000 cu. ft. gas, Marble Falls 2,765-2,800 ft.

Jones County: Chittenden area—Walter K. & Byron W. Jones 1 Chittenden estate, Louis Krtax Sur., 2 mi. SW Radium, pumped 102 bbl. 37.8°-gravity oil a day, Flippen 2,617-45 ft.

Palo Pinto County: Ernest Lloyd 1 Pat Dalton, C. A. Dalton Sur. A-1,555, 6 mi. W Graford, flowed 2,000,000 cu. ft. gas, sand 1,157-64 ft., 1,175-90 ft., shut-in pressure 425 lb., TD 1,222 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Callahan County: Hedrick Oil Co. 1 R. D. Williams, Sec. 64, Bayland Orphans Home, 8 mi. NE Baird, dry, TD 2,168 ft.

Coleman County: L. L. Home 1 J. E. McCord, J. H. Gibson Sur. 16, 2 mi. N Glen Cove, dry, TD 3,963 ft., Morris 3,425 ft., Capps 3,446 ft., Gardner 3,706 ft., Gray 3,826 ft.

SOUTH LOUISIANA

Calcasieu Parish Has New Oil Discovery

NEW ORLEANS.—A new oil pool for South Louisiana has been opened by Sohio Petroleum Co. 2 Farmers Land & Canal Co., in 26-10s-7w, 1½ miles north of Holmwood townsite in Calcasieu Parish. Drilled to a total depth of 11,250 ft., this well was completed through perforations at 10,354-62 ft., for a state potential of 291.6 bbl. of pipe-line oil in 24 hours, through a 5/32-in. choke, with 1,850 lb. pressure on the tubing and casing sealed, with 37.5°-gravity oil, no water content in the test. The 7-in. casing is cemented at 10,874 ft. Top of oil sand is 10,350-70 ft.

A prospective new gas pool opener for Cameron Parish is Magnolia Petroleum Co. 1-C Lutcher, located 4 miles northeast of Mud Lake gas field in Section 24-14s-11w. Five-inch liner was cemented in the hole from 10,855-11,705 ft., total depth. Cement was drilled from 11,498-11,665 ft. after which a dry test was made of the cement job, and mud is being conditioned for an initial test. Numerous gas and condensate bearing sands have been encountered in this test with the lowest shows reported in a broken sand section from 11,299-11,310 ft.

The 10 new locations reported for South Louisiana included only 1 wildcat in Rapides Parish. The wildcats completed were dry, one each in Evangeline and Jefferson Davis Parish. The five producers completed were in proven areas.

SOUTH LOUISIANA WILDCAT FAILURES

Evangeline Parish: Phillips Pet. Co. 1 Vidrine, 32-5s-1w, 7 mi. SW of Mamou field, dry, TD 12,346 ft.

Jefferson Davis Parish: Falcon-Seaboard Drlg. Co. et al 1 W. E. Walker, 32-7s-4w, 4 mi. W of China field in Serpent Bayou area, dry, TD 8,005 ft.

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LA.-ARK.

DeSoto Parish Wildcat May Open New Pettit Production

SHREVEPORT.—In DeSoto Parish, 6 miles north of the Logansport gas field, Rogers Lacy et al 1 Pace, SE NW 28-13n-16w, has promise of becoming an important Pettit limestone discovery if encroaching salt water can be sealed off. Drilled to 6,648 ft. in the Travis Peak, perforations in that zone were squeezed off and new shots placed at 6,326-36 ft. A drill-stem test of that interval would not flow naturally, but when treated with 4,000 gal. of acid, it flowed at the estimated rate of 450-500 bbl. of oil a day. At the end of the second hour, however, salt water was showing and at the end of 6 hours, the flow was down to 20 bbl. of fluid an hour, about half of which was salt water. Flowing tubing pressure had dropped from 500 to 200 lb. Operators were to continue testing the Pettit zone.

The Cotton Valley Operators Committee 2 Oliphant-Banks, SE NW 34-21n-10w, deep test in the Cotton Valley field of Webster Parish, was drilling below 14,202 ft. in salt and streaks of anhydrite on last report. A drill-stem test at 10,292-11,678 ft., open 5 hours, made a slight blow, recovered 2,880 ft. of gas-cut water cushion and 4,410 ft. of gas-cut mud. Flowing bottom-hole pressure was 3,750 lb., which rose to 9,300 lb. when shut in. This test was a Travis Peak producer which was depleted in 1945. Deepening operations began in September 1946. Present deepest production in the field is 10,650-81 ft., also said to be the deepest test for the field before the 2 Oliphant-Banks surpassed this depth.

NORTH LOUISIANA WILDCAT FAILURES

DeSoto Parish: E. C. Laster 1 Herbert-Woolworth, SE NE SW 30-14n-14w, dry, TD 4,256 ft., electric log tops: base Austin 2,900 ft., Callery sand 4,243-44 ft., elev. 260 ft.

Sabine Parish: R. W. Norton estate 1 Long Leaf Lumber Co., SW SW NW 13-6n-13w, dry, TD 5,492 ft., no tops reported.

ARKANSAS WILDCAT FAILURE

Columbia County: McAlester Fuel Co. 1-A Westbrook, SE SE 5-16s-20w, dry, TD 4,211 ft.

Miller County: T. J. Conway 2 E. A. Attaway, SE SE NE 3-17s-26w, dry, TD 3,720 ft., electric log tops: Nacadoch 1,760 ft., fault 2,312 ft., Tokio 2,740 ft., sand with salt water 2,815-40 ft., Tuscaloosa 3,126 ft., Paluxy 3,300 ft., elev. 224 ft.

PERMIAN BASIN

South Extension Assured For New Andector Field

MIDLAND.—Humble Oil & Refining Co. 1-G R. B. Cowden, Section 1, Block 45, T&P Survey, while not at the completion stage, had assured the new Andector field of Andrews County a 1-mile south extension. A 1-hour test in the Ellenburger at 8,620-39 ft. brought gas to the surface in 5 minutes and recovered over 8,000 ft. of clean oil. Operators were to check the pay zone with electric log before making completion tests.

Sun Oil Co. 1 Fred Jameson, south offset to the company's Coke County Pennsylvanian discovery, took a 51-minute drill-stem test at 6,160-90 ft., which put gas to the surface in 6 minutes, and oil in 47 minutes. Total recovery was 1,440 ft. of oil. The hole was estimated to have filled with oil at the rate of 21 bbl. an hour. Operators then cored ahead, recovering additional limestone showing fair to good fluorescence, good porosity and staining, to 6,200 ft. Operators had taken another drill-stem test at the latter depth, but results had not been reported. Meanwhile, Sun staked a ¼-mile west offset to the discovery at its 1 H. H. Jameson.

A fourth producing zone was indicated last week for the Fullerton field in northwestern Andrews County. Mid-Continent Petroleum Corp. 7-9 University, on the southwest side of the field, flowed into pits at the rate of 40-50 bbl. of oil an hour from the Wichita limestone group of the lower Permian at 7,852-7,933 ft. A drill-stem test at that depth put gas to the surface in 9 minutes, making an estimated rate of 5,000,000 cu. ft. a day, with oil starting to flow at the end of 20 minutes. Flowing bottom-hole pressure was 1,700 lb., and when shut in 15 minutes, built up to 3,200 lb.

WEST TEXAS WILDCAT FAILURES

Andrews County: Humble Oil & Refining Co. 1 Pinson, Sec. 13, Blk. A-40, PSL Sur., 7 mi. SE Eunice, N. M., dry, TD 10,861 ft. in pre-Cambrian, anhydrite 1,490 ft., Yates 2,840 ft., Devonian 8,060 ft., upper Silurian 8,430 ft., Simpson 9,900 ft., Ellenburger 10,647 ft., pre-Cambrian 10,829 ft., elev. 3,335 ft.

Olson Drilling Co. and Skelly Oil Co. 1-A Lockhart & Brown, Sec. 21, Blk. A-41, PSL Sur., 2 mi. E Martin field, dry, TD 9,974 ft., Yates 2,910 ft., San Andres 4,460 ft., Glorietta 5,640 ft., Tubb 6,660 ft., Pennsylvanian 8,510 ft., Devonian 9,500 ft., elev. 3,260 ft.

Union Oil Co. of California 1-F Mrs. A. C. Means, Sec. 1, Blk. A-46, PSL Sur., 2½ mi. N Andrews, dry, TD 4,756 ft., San Andres 2,080 ft., Yates 3,050 ft., Grayburg 4,300 ft., elev. 3,191 ft.

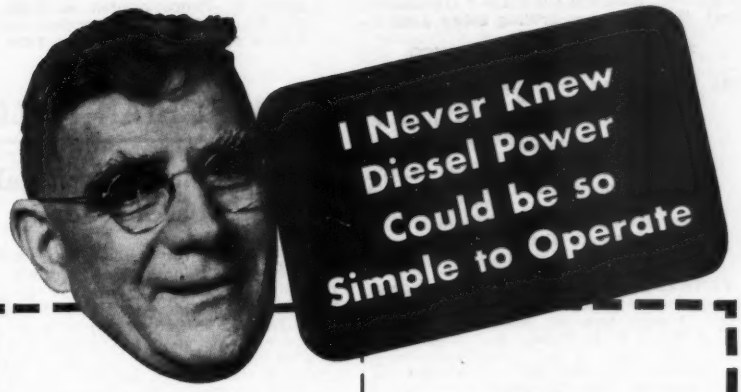
Terrell County: John T. Perkins et al 1 Lee McCue, Sec. 3, Blk. 152, ELRR Sur., 2½ mi. NW Sanderson, dry, TD 1,489 ft. in limestone, slight show oil and gas 1,100-1,480 ft.

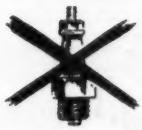
SOUTHEASTERN NEW MEXICO

HOBBS.—The Texas Co. 1 Garrett, East Central Lea County wildcat, 8 miles northeast of the Lovington field, in SE NE 22-16s-38e, set 5½-in. casing at 5,540 ft., after drilling to 5,760 ft. Operators were to drill out and test shows of oil found between bottom of casing and total depth.

In southeastern Chaves County, 30 miles east and slightly south of Roswell, Richfield Oil Corp. staked location for a 10,000-ft. rotary wildcat. The test will be the 1 White, SW SE 6-12s-29e. The projected depth is expected to penetrate to the pre-Cambrian system.

In the southern part of Chaves County, Honolulu Oil Corp. et al 1 Mullis, 21-15s-29e, 10 miles east of Lake Arthur, was drilling below 7,688 ft. About 15 miles east





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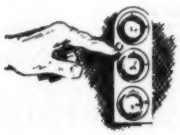

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DIESEL'S THE POWER . . .

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of Roswell, Richfield Oil Corp. 1 Comanche unit, 13-11s-26e, was drilling below 5,265 ft.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURES

Lea County: Bay Petroleum Co. 1 Loomis, NW NE 23-20s-33e, N of Lynch field, dry, TD 3,433 ft., anhydrite 1,405 ft., salt 1,550 ft., Yates 3,165 ft., elev. 3,612 ft.

Sun Oil Co. 1-B McKinley, NW NE SW 20-18s-38e (deep test in Hobbs field, old TD 4,242 ft.), dry at 8,010 ft. in Permian limestone, electric log tops: Glorietta 5,580 ft., Clear Fork 6,010 ft., Tubbs 6,590 ft., elev. 3,657 ft.

PANHANDLE SUCCESSFUL WILDCAT (DISTRICT 10)

Hale County: New oil field: Stanolind Oil & Gas 1 E. L. Fisher, Sec. 5, Blk. CL, ELRR Sur., 6 mi. NW Petersburg, flowed 1,341 bbl. oil a day, 28/64-in. choke on 2-in. at 6,875 ft., in Cisco series of Pennsylvanian at 6,895-6,992 ft., 39° gravity, casing pressure 100 lb., tubing pressure 410 lb., elev. 3,316 ft.

APPALACHIAN FIELD

West Virginia Rotary Well To Test Oriskany Sand

PITTSBURGH.—In Williamsburg district, Greenbrier County, West Virginia, The Texas Co. topped the Oriskany sand at 6,538 ft. in the important rotary test on G. R. Dean farm and drilled 30 ft. in that sand for a drill-stem test. From the surface elevation of 2,575 ft. the Oriskany is placed at —3,963 ft. and the Corniferous chert at —3,856 ft. It is important as it tests an entirely new area of the Appalachian.

In Big Sandy district, Kanawha County, United Fuel Gas Co. completed the test 5,761 W. A. MacCorkle which gaged 4,500,000 cu. ft. gas, natural, when turned in the lines. Surface elevation was 1,010 ft., Corniferous lime 5,251 ft., Oriskany 5,374-5,402 ft., gas 5,376 ft. and gas 5,391-95 ft. Rock pressure was 800 lb. in 48 hours. Total depth is 5,402 ft.

In Wayne Township, Erie County, northwest Pennsylvania, Pennsylvania Gas Co. is drilling at 3,758 ft. in the wilcat on C. J. Follette farm with the Onondaga logged at 3,185 ft.

In the new gas pool in Patton Township, Allegheny County, Peoples Natural Gas Co. completed the offset test Jean V. and C. P. Smith in the Bayard sand with a final gage of 469,000 cu. ft. gas, or much smaller than the original strike. The Murraysville sand was placed at 1,719-1,821 ft., gas 1,724 ft., Hundred Foot sand 1,830-1,905 ft., gas 1,878 ft., Sixth (Bayard) sand 2,384-2,411 ft., gas 2,387 ft., gas 2,395 ft. and total depth 2,431 ft. The Hundred Foot gas was cased off.

New locations in this section totaled nine and were in Armstrong, Clarion, Fayette, and Jefferson counties.

In West Virginia, new locations totaled 18 and were in Boone, Calhoun, Gilmer, Jackson, Kanawha, Lewis, and Wyoming counties.

EASTERN TEXAS

Travis Peak Test Scheduled For Mexia Woodbine Field

DALLAS.—The southern end of the Mexia Woodbine field of Limestone County was due a Travis Peak test, according to reports here last week. Pure Oil Co. announced location for its 40 A. E. Berthelson, in the Pedro Varela Survey, 3 miles southwest of the town of Mexia. Other tests have been made on the Travis Peak in this field. In 1940 S. J. Taylor et al 1 Reid was drilled to 6,126 ft., having topped the Travis Peak at 5,795 ft., which was dry. Location was on the northwest flank of the producing area. Southeast of Mexia, in the W. D. Smith Survey, Gregg-Tex Gasoline Co. 1 Baker, was drilling ahead at 7,397 ft. Its objective was the Smackover.

In the Friendship area of northeastern Smith County, Bobby Manzield was reported moving in to retest at the 1 J. L. Morrison, in the S. J. Lott Survey. This dry hole, drilled to 8,110 ft. in the Travis Peak in 1944, was thought to have a faulty casing job, giving no real indications of the oil shows found in the Rodessa and Pettit limestone zones. Present plans called for the casing to be pulled and part of the hole to be redrilled.

EAST TEXAS WILDCAT FAILURES

Hunt County: Lynes & Douglas 1 J. T. Rankin, E. Mitchell Sur., 7 mi. NE Greenville, dry, TD 3,324 ft.

John Wrather 1 A. W. Thompson, P. P. Woodberry Sur., dry, TD 2,902 ft.

Limestone County: Garvin Oil Co. 1-A Bell Arnett, P. Varella Sur., 5 mi. NW Groesbeck, dry, TD 5,825 ft., electric log tops. Pecan 1,690 ft., Austin 2,473-2,790 ft., Woodbine 2,907 ft., Edwards 3,655 ft., Paluxy 3,985 ft., Glenrose 4,034 ft., Pettit 5,430 ft., Travis Peak 5,563 ft., elev. 439 ft., had salt water and some oil in Pettit, pressure built up to 890 lb., acidized and swabbed 20 per cent salt water initially, then 100 per cent salt water.

Navarro County: O. W. Killam 1 G. W. Tickle, James T. Bell Sur., S of Purdon, dry, TD 2,217 ft.

Robertson County: H. H. Coffield 1 C. P. Briggs, T. J. Chambers Sur., 4 mi. NW Calvert, dry, TD 2,250 ft.

What's The Limit?

An oil well, brought in April 11, 1946, near New Iberia, Louisiana, produces from a depth of more than two and a half miles. Man reaches deeper and deeper into nature's storehouse. What's the limit?

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American Hammered Piston Rings

PISTON RINGS IN EVERY SIZE — OF EVERY TYPE—FOR EVERY SERVICE

Rusk County: Tide Water and Seaboard 1 Mrs. Maud Bird, James McClain Sur., 12 mi. NE Henderson, dry, TD 7,297 ft., sample tops: Austin 3,048 ft., Paluxy 4,200 ft., Massive anhydrite 5,645 ft., Pettit 6,820 ft., Travis Peak 7,110 ft.

Shelby County: B. F. Phillips 1 Pickering Lumber Co., 3 mi. N Shelbyville, dry, TD 6,518 ft., sample tops: Austin 2,810 ft., Glenrose 3,740 ft., Massive anhydrite 5,215 ft., Pettit 6,265 ft., porosity 6,495-6,500 ft., elev. 240 ft.

Wood County: Bennett & Sorrels 1 R. G. Maclin, Wm. Wallace Sur., 3 mi. W Crow, dry, TD 7,821 ft. (old TD 5,510 ft. in shale), sample tops: Pecan 3,810 ft., Austin 6,510 ft., Woodbine 7,672 ft., no shows:

CALIFORNIA

Extensive Wildcatting To Continue During 1947

LOS ANGELES.—Evidence accumulates in the weekly records of wildcat locations that there will likely be no abatement this year in the search for new fields, despite somewhat discouraging results of wildcat drilling in the year just past. Locations are, however, largely around existing fields rather than in untried territory—a reflection of a few minor successes that have resulted from this type of prospecting in the recent past.

The bulk of the new locations continues to be in Kern County and there were seven recorded last week. A 2,500-ft. test, B-1 Tejon, will be drilled by Richfield Oil Corp. in 28-11n-18w, about 4 miles northeast of its producing wells in the Tejon field.

On the east side of the McKittrick field, in 22-30s-22e, E. A. Parkford will drill a 6,500-ft. test. To the north, about 4 miles north of the North Belridge field in 3-27s-20e, Casner and Bentz have staked location for 1 Osmont.

In Santa Barbara County, Union Oil Co. is seeking southerly extension of the Lompoc field where it has spudded 46 Purisima in 14-7n-34w. Union has completed many good wells in the Lompoc field which it discovered in 1903. Gravity of the oil varies from 15° to 24°.

Showings on the electric log run in Pacific Western Oil Corp. 1 National Royalties in Kern County, until recently the world's deepest well, have been of sufficient promise to justify the running of a full string of 5½-in. casing. The casing was set at 16,400 ft. or just 31 ft. above the top of the drill-collar fish. Casing will be gun-perforated for production tests.

Production tests have been delayed in Middle Dome Corp. 73-30V, deep sand discovery on Kettleman Hills Middle Dome, due to trouble with bottom-hole choke. Standard of California, operator, is running tubing with packer preparatory to testing. West of this discovery in territory outside the Middle Dome Corp. unit plan, Danciger Oil & Refining Co. has taken a 20-year oil and gas lease covering the NE 25-23s-18e. A well drilled on this property about 10 years ago produced a small quantity of 24°-gravity oil, probably from the Brown shale at 6,800-7,000 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Round Mountain area: Independent Exploration Co. 1 Olcese, 21-28s-29e, dry, TD 1,879 ft.

Tulare County, Traver area: Superior Oil Co. 1 Pratt, 13-17s-23e, dry, TD 3,887 ft.

San Joaquin County, Fairchild area: The Ohio Oil Co. 1 Edward W. Avila, 6-1s-6e, dry, TD 4,400 ft.

Kern County, Edison area: W. R. Gerard 2 Gerard-Edison, 23-30s-29e, dry, TD 2,640 ft.

Edison area: Monterey Exploration Co. 52-22 Nozu-Berry, 22-30s-29e, dry, TD 3,609 ft.

Edison area: Rocket Petroleum Co. 1 Oriole, 23-30s-29e, dry, TD 2,641 ft.

MISSISSIPPI

Deep Wildcat in Amite County Coring Ahead

JACKSON.—In Amite County, Gulf Refining Co.'s deep wildcat, the 1 Rowland, 39-4n-2e, had progressed to 11,330 ft., and was coring ahead. Side-wall samples taken from 10,593-751 ft. contained sand with no shows, but at 11,276 ft. there was sand with a slight show of oil.

In Wayne County, Humble Oil & Refining Co. B-2 GM&O Land Co., 24-9n-8w, was setting casing on bottom at 9,866 ft. It was reported that operators might drill ahead to 13,000 ft. Woodley Petroleum Co. 1 Womack-Butler, 36-1n-6e, Smith County, was drilling ahead below 8,820 ft., with no shows. In Jones County, Gulf Refining Co. 1 Major, 29-6n-11w, was pulling stuck drill pipe at 8,258 ft. Total depth is 8,954 ft.

Gulf 1 Ella G. Lees, 27-7n-1w, of the Cranfield field, Adams County, flowed 330 bbl. of oil a day through 5/32-in. choke on completion tests. Tubing pressure was 1,825 lb.

MISSISSIPPI WILDCAT FAILURES

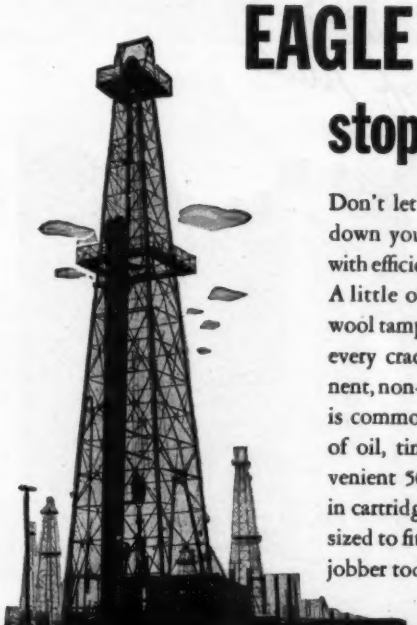
Walthall County: Maner Graham 1 John A. Packwood, 23-3n-11e, dry at 10,253 ft., Austin 8,498 ft., Tuscaloosa 8,872 ft., lower Cretaceous 10,245 ft.

Washington County: C. H. Murphy 1 Brown, SE NE 19-16n-7w, dry at 5,077 ft., no log.

ALABAMA WILDCAT FAILURE

Montgomery County: Dr. S. D. Suggs 1 fee,

EAGLE LEAD WOOL
stops bottom water!



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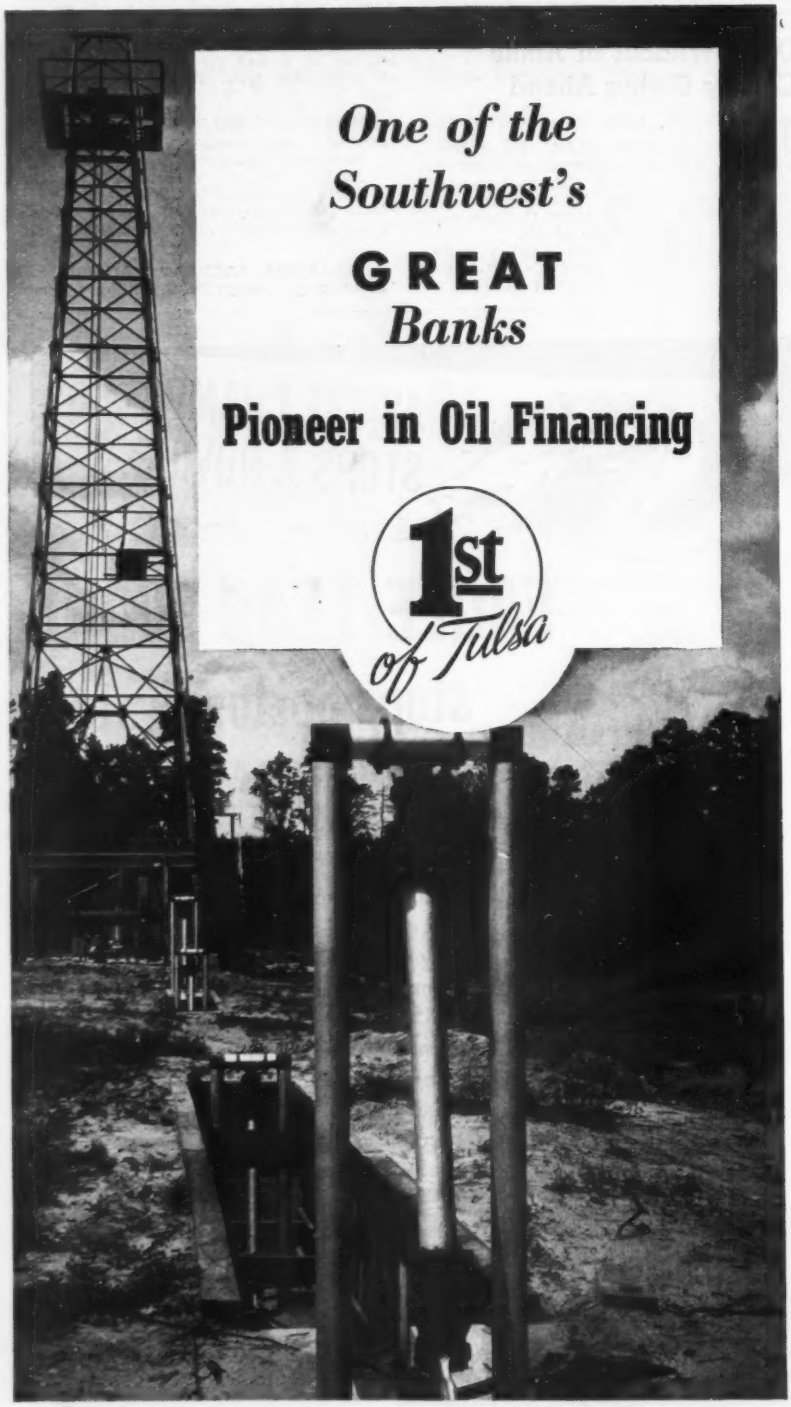

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SE SE 19-15n-17e, dry, TD 1,505 ft., no tops reported.

FLORIDA WILDCAT FAILURE

Gulf County: Pure Oil Co. 3 St. Joe Paper Co., SW SW NE 3-6s-11w, dry, TD 5,025 ft.

TEXAS GULF COAST

First Cockfield Production Found in Lavaca County

HOUSTON — First Cockfield production for Lavaca County was reported with the completion of Shell Oil Co. 2 E. T. Neuhaus, in the Provident City-Vienna area in the east corner of that county. This well is also the first oil production for the Provident City field, and a new pay zone for the field. Drilled to a total depth of 8,558 ft., through the Wilcox sands, the well was plugged back to 5,495 ft. for completion. On potential gage it flowed 131.7 bbl. of 46.2°-gravity pipe-line oil per day through a ⅛-in. choke, tubing pressure 720 lb., casing 1,080 lb., with no water in the flow. This well is located in the John W. Wynemaker Survey, approximately 1½ miles northwest of the Provident City field discovery well and 1 mile south of the Vienna field. These fields are Wilcox zone fields.

The Lagarto field has been extended 1 mile northeast in the completion of Houston Oil Co. 40 Cartwright for gas-condensate production through perforations at 5,574-82 ft. This well is located in the Wm. J. Cannon Survey, Live Oak County.

There were 26 new locations this week, 4 being wildcats, 2 in Wharton and 1 each in Victoria and Wilson counties. There were five successful exploratory tests completed, four being new pays 1 each in Colorado, Lavaca, Refugio and Wharton counties, and 1 new gas pool opener in Chambers County. One dry wildcat was reported in Karnes County.

TEXAS GULF COAST SUCCESSFUL WILDCATS

Chambers County: New gas pool: Gulf Oil 4 J. E. Jackson, Jno. S. Roberts Sur., Jackson Pasture area, TD 8,235 ft., top sand 8,083 ft., perf. 8,088-98 ft., gas well, shut in, no gage, TP 1,850 lb.

Colorado County: New gas-condensate pay, Nada field—Ohio Oil Co. 1-A Nada Unit, in Indianola R.R. Co. and J. D. Schulze Sur., 5 mi. SW of Nada townsite, TD 10,336 ft., top sand 9,910 ft., perf. 9,910-16 ft., IP ungaged amount of gas and condensate, shut in, TP 4,500 lb., CP 3,600 lb., gravity 51°, no water.

Lavaca County: New oil pay, Provident City field—Shell Oil 2 E. T. Neuhaus, in John W. Wynemaker Sur., 1½ mi. NW of Provident City field discovery well (1 F. W. Neuhaus) and 1 mi. S of Vienna field, TD 8,558 ft., top pay 5,402 ft., Conroe sand, perf. 5,403-12 ft., IP 132 bbl. oil per day through a ⅛-in. choke, TP 720 lb., CP 1,080 lb., gravity 46°, no water.

Refugio County: New gas pay, Huff field—P. R. Rutherford et al 1 R. H. Morrow, in Edward Perry Sur., TD 5,666 ft., top pay 4,450 ft., perf. 4,450-64 ft., IP 18,000,000 cu. ft. gas per day on open flow, dry gas.

Wharton County: New gas pay — North Louise field—Ralph A. Johnston 1 S. G. Shrader, in J. A. Hamilton Sur. (workover), TD 4,449 ft., top sand 4,437-49 ft., perf. 4,437-48 ft., IP 2,464,000 cu. ft. gas per day through ¼-in. choke, TP 1,665 lb., shut-in TP 1,765 lb., CP 1,700 lb.

TEXAS GULF COAST WILDCAT FAILURE

Karnes County: H. R. Smith et al 2 V. M. Butler, in George Elliott Sur. 138, 5 mi. N of Fashing, near Atascoa line, line, dry, TD 3,900 ft.

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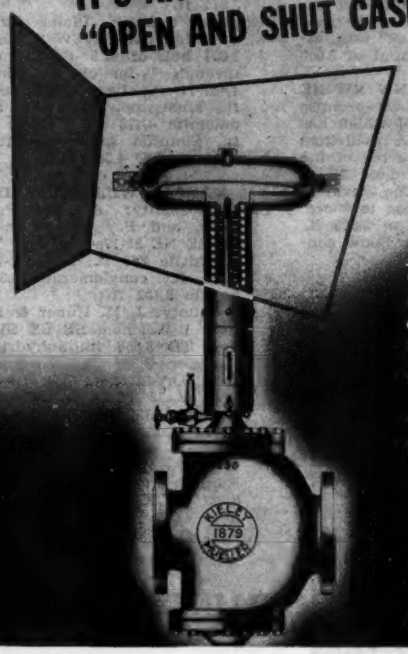

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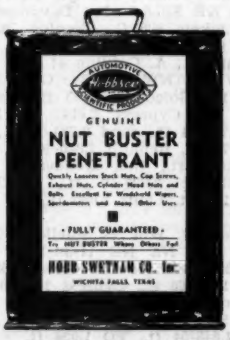

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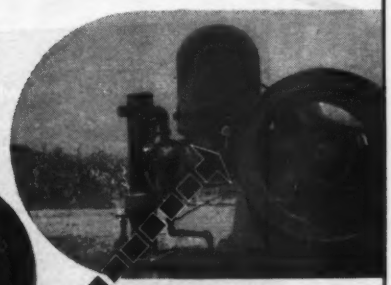

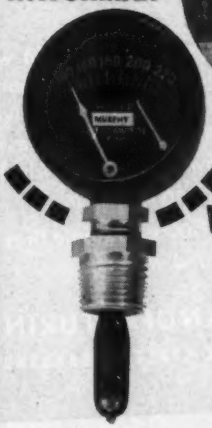

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Write for Bulletin #5

KANSAS

New Arbuckle Pool Found In Ellis County

STANOLIND OIL & GAS CO. I Irvin, SE SE SE 6-14s-19w, Ellis County, opens a new Arbuckle pool. A drill-stem test at 3,853-60 ft., 1 to 8 ft. in the Arbuckle, showed oil-cut mud. The well was deepened to 3,874 ft., or 22 ft. in the Arbuckle and swabbed 11 bbl. oil per hour for 12 hours after being treated with 1,000 gal. of acid. The nearest production to this discovery is the Pleasant pool 2 miles west, which produces from the conglomerate, and the Krause pool 3 miles south, which produces from the Sooy and Gorham.

Sunray Oil Corp. 1 Wilson, SE SW SE 36-10s-18w, Rooks County, swabbed 50 bbl. oil per hour, 2,000 ft. off bottom, for 3 hours from the Arbuckle. The well is ¼ mile northeast of the Continental Oil Co. 1 Mortgage, the discovery well of the new Burnett Northwest pool, which was assigned a maximum daily potential of 3,000 bbl.

The Doley Oil Co. 1 Moon, NW NW NE 20-13s-21w, Trego County, shows promise of reopening the old Riga pool which has been abandoned since 1935. A drill-stem test taken at 3,902-38 ft., in the top of the Sooy conglomerate, recovered 1,050 ft. of 35°-gravity oil in 25 minutes. The elevation of the well is 2,232 ft. Formation tops are: Anhydrite at 1,625 ft., Topeka at 3,343 ft., Kansas City at 3,573 ft. and Sooy conglomerate at 3,914 ft.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Stanolind Oil & Gas 1 Irvin, SE SE SE 6-14s-19w, pumped 142 bbl. of 37°-gravity oil per day from Arbuckle at 3,853-60 ft.; anhydrite 1,510 ft., Lansing-Kansas City 3,510 ft., TD 3,874 ft.

Kingman County: Plains Exploration 1 Swander, SW SE SW 20-28s-9w, flowed 1,604 bbl. of 41.8°-gravity oil per day through ½-in. choke from Viola at 4,407-11 ft.; Lansing-Kansas City 3,563 ft., Mississippi lime 4,129 ft., Simpson dolomite 4,473 ft., Simpson shale 4,479 ft., Simpson sand 4,484 ft., Arbuckle 4,556 ft., TD 4,565 ft.

KANSAS WILDCAT FAILURES

Barton County: Anderson-Prichard Oil Corp. and Pey Petroleum 1 Putnam, SE SE NE 25-17s-14w, dry, TD 3,441 ft., anhydrite 865 ft., Lansing-Kansas City 3,183 ft., conglomerate 3,394 ft., Arbuckle 3,432 ft.

Rush County: J. M. Huber & E. F. Wakefield 1 Weichen, SE SE SW 7-18s-17w, dry, TD 3,866 ft., anhydrite 1,171 ft., Heebner 3,376 ft., Toronto 3,397 ft., Base Oread 3,411 ft., Lansing-Kansas City, 3,432 ft., conglomerate 3,791 ft., Arbuckle 3,816 ft.

Sedgwick County: Anderson-Prichard Oil Corp. 1 Bertrand "C," NE NW SE 19-27s-4w, dry, TD 4,165 ft., Lansing-Kansas City 2,880 ft., Mississippi lime 3,723 ft., Kinderhook 3,999 ft., Maquoketa 4,098 ft., Viola 4,127 ft., Simpson 4,151 ft.

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ILLINOIS

Acid Increases Flow At Browns Discovery

MATTOON.—F. J. Fleming and A. K. Swann 1 William Beberich, SE SE NW 26-1s-14w, Wabash County, the discovery well in the "Browns pool," completed in January for 275 bbl. natural has been acidized in the McClosky at 2,964-77 ft. After 3,000 gal. acid, the well flowed through casing, 854 bbl. the first 24 hours, 808 bbl. the second 24 hours, and 806 bbl. the third 24 hours.

In the Concord area of White County, where wells are being completed in the Aux Vases at about 2,900 ft. and the McClosky at about 3,025 ft., there are at present 15 active operations.

ILLINOIS SUCCESSFUL WILDCAT

Gallatin County: Coy & Ashland 1 Foster, NW SE NW 11-8s-9e, pumped 24 bbl. oil and 2 bbl. water, 30-qt. shot 2,335-50 ft., Hardinsburg 2,330-57 ft., show oil, 5 in., 2,328 ft., TD 2,360 ft.

ILLINOIS WILDCAT FAILURES

Hancock County: Smith & Coyle 1 Johnson "A," SE NE SE 6-3n-5w, Devonian 560 ft., Maquoketa 605 ft., Trenton 742 ft., TD 986 ft.

Jasper County: L. A. Grilling et al 1 Morgan, SW NE NW 8-5n-8e, Glen Dean 2,430-50 ft., Golconda 2,493 ft., Barlow 2,578-99 ft., Cypress 2,624 ft., Paint Creek 2,720-24 ft., sand 2,734-63 ft., Benoist 2,776 ft., Renault 2,840-46 ft., Aux Vases 2,846 ft., Ste. Genevieve 2,918 ft., Rosiclare 2,929-40 ft., McClosky 3,069-71 ft., St. Louis 3,080 ft., TD 3,090 ft.

Lawrence County: Wm. P. Mueller 1 Menderman, SW NE NE 11-3n-11w, Glen Dean 1,399-1,415 ft., Golconda 1,462 ft., Barlow 1,547-68 ft., Cypress 1,577-84 ft., Paint Creek 1,657-68 ft., Benoist 1,686-98 ft., Ste. Genevieve 1,776 ft., McClosky 1,848-54 ft., TD 1,926 ft.

Perry County: T. W. Carroll 1 Frank E. Nehring, SE NE NW 6-4s-1w, Glen Dean 978 ft., Golconda 1,064 ft., Barlow 1,144-60 ft., Paint Creek 1,272-80 ft., lower Paint Creek 1,290-1,318 ft., TD 1,400 ft.

Richland County: Fryer & Simpson Drilling Co. 1 Drewes, NE NW NW 13-4n-10e, Fredonia 3,068 ft., McClosky 3,072-79 ft., TD 3,105 ft., swabbed ½ bbl. oil and 1½ bbl. water hourly, deepened to 3,093 ft., tested 950 ft. water and 40 ft. oil, filled up 2,300 ft. with water at 3,105 ft.

White County: McBride 1 C. Burkhart, NE SE SW 34-4s-9e, Menard 2,472 ft., Tar Springs 2,596-2,605 ft., Glen Dean 2,719-42 ft., Golconda 2,832 ft., Barlow 3,098-3,106 ft., Renault 3,205 ft., Aux Vases 3,264-88 ft., Ste. Genevieve 3,321 ft., TD 3,423 ft.

OKLAHOMA

Amerada Opens New Pool West of Velma Field

AMERADA PEROLEUM CORP. 1 Jacobs, SW SE NE 13-1s-6w, Stevens County, opens a new pool about 2½ miles west of the Velma pool. The well flowed 379 bbl. of oil through tubing chokes on a 24-hour test, after plugging back from a total depth of 4,968 ft. to 3,710 ft. Five-and-one-half-inch casing was set at 3,610 ft.

Shell Oil Co. 1 Walters, NE SW 14-10n-21w, Beckham County, a rank wildcat 11 miles east and 6 miles north of the Sayre gas field, is reported to have encountered a large gas flow in the Pennsylvanian topped at 12,135 ft. A drill-stem test at 12,137 ft. showed an estimated gas volume of 75,000,000 cu. ft. Nine-and-five-eighths-inch casing was set at 5,449 ft. and 7-in. at 12,135 ft.

Aladdin Petroleum Co. 1 McGinley, NW NW NW 9-19n-1w, Payne County, appears to be giving the old Orlando pool, which was producing from the Misener, an important discovery in the Wilcox. The test, which is 1 mile east of an old Misener sand well, found the Misener at 4,783 ft. with a show of oil and water. Seven-inch casing was set at 4,784 ft., Viola was topped at 4,797 ft., and after penetrating Viola to 4,837 ft., the well swabbed 40 bbl. oil and 160 bbl. water in 16 hours after being treated with 1,000 gal. acid. On further deepening, Simpson dolomite was topped at 4,854 ft. and first Wilcox sand at 4,881 ft. The Wilcox was penetrated 5 ft., tubing was run and the well flowed into pits, under heavy gas pressure, at an estimated rate of 40 bbl. of oil per hour, which appeared to be free of water.

OKLAHOMA SUCCESSFUL WILDCATS

Cotton County: Bridwell Oil 1 Port, E/2 SW NW 25-3s-11w, produced 16 bbl. of oil per day from sand at 1,477-82 ft., TD 1,482 ft.

Creek County: Mid-Continent Petroleum Corp. 1 Thompson, SE NW SW 11-6n-8e, pumped 20 bbl. of 38°-gravity oil per day from Booch at 2,670-90 ft.; Calvin 690 ft., Senora lime 1,215-19 ft., Senora sand 1,240 ft., Thurman 1,637-55 ft., Earlsboro 1,750-95 ft., brown lime 2,540 ft., TD 2,730 ft.

McClain County: C. L. Carlock 1 Ainsworth, NE NW SE 26-5n-4w, produced 662 bbl. of oil per day from 9,892-9,940 ft., TD 10,997 ft.

Stephens County: Coline Oil Co. 1 Cooper, SE NW SE 1-2n-8w, flowed 15 bbl. of 40°-gravity oil per day from sand at 9,015-40 ft.; limy sand 11,105 ft., with a stain of oil, conglomerate 11,280-334 ft., sandy shale 12,100-22 ft., TD 12,159 ft.

OKLAHOMA WILDCAT FAILURES

Choctaw County: Cargill Brothers 1 Jordon, SW SW SE 6-5s-15e, dry, TD 155 ft., no tops reported.

Comanche County: Sam Brince et al 1 Haskins, SE SE NE 28-1n-10w, dry, TD 2,450 ft., no tops reported.

D. H. Bolin 1 Scruggs, SE SE SW 29-1n-10w, dry, TD 2,520 ft., no tops reported.

Cotton County: Knight & Hastings 1-A Parks, NE NE NE 15-2s-11w, dry, TD 2,208 ft., no tops reported.

R. G. Anderson 1 Musgrove, NE NE NE 21-2s-11w, dry, TD 2,208 ft., no tops reported.

Kingwood Oil 1 Dugan, NE NE SW 1-3s-11w, dry, TD 2,517 ft., no tops reported.

J. W. Baldwin 1 Hardin, NE NE NW 26-3s-11w, dry, TD 1,700 ft., no tops reported.

J. F. Richardson 1 Gandy, SE SE NW 30-3s-9w, dry, TD 2,020 ft., no tops reported.

Joe Moore 1 Neal, SE SE SE 12-4s-12w, dry, TD 2,107 ft., no tops reported.

Akin & Dimock 1 Miller, SW SE NE 1-5s-13w, dry, TD 2,402 ft., no tops reported.

J. Ben Russell 1 Dowlin, NE NW NW 11-5s-10w, dry, TD 2,007 ft., no tops reported.

Clark & Cowden 1 Wood-Ah-Pe-Op, SW SW SW 15-2s-12w, dry, TD 2,110 ft., sand 1,410-35 ft., shale and sand 1,435-90 ft., sand 1,870-95 ft. and 1,920-40 ft., sandy shale 1,940-53 ft., lime 1,955-2,006 ft.

J. D. Nantz 1 Gilliam, SW SW SE 14-2s-10w, dry, TD 1,496 ft., no tops reported.

Akin & Dimock 1 Tyler, SW SW SW 26-3s-11w, dry, TD 1,556 ft., no tops reported.

Neeld & Hood 1 Dilks, NE NE SE 27-3s-11w, dry, TD 1,610 ft., sand 1,218-22 ft., sandy conglomerate 1,222-75 ft.

C. W. Smith 1 Shaffer, NW NW SE 18-3s-10w, dry, TD 2,505 ft., sand 1,020-42 ft.

Featherston Oil 1 Hubbell, SE SE SW 35-4s-10w, dry, TD 2,105 ft.

Nixon Petroleum Co. 1 Jones, NW NW SE 16-5s-12w, dry, TD 3,375 ft., Megargel lime 1,767-68 ft., sandy lime 1,768-78 ft., sandy shale 1,778-1,822 ft.,

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sand and lime 1,938-52 ft., Canyon 2,396 ft., Arbuckle 3,343 ft.

J. H. Grimm 1 Campbell, NE NW SW 10-5s-10w, dry, TD 1,590 ft., sand 1,050-70 ft., 1,115-30 ft., 1,140-70 ft. and 1,280-1,310 ft.

Jefferson County: Cities Service Oil 1 Gardner, SE SE NE 36-5s-9w, dry, TD 3,708 ft., sand 1,400-12 ft., 1,428-31 ft. and 1,515-26 ft.

Davidor Brothers 1 Trout, NE SE NW NE 35-6s-6w, dry, TD 2,505 ft., no tops reported.

McClain County: California Co. 1 Thompson, SE SE SE 24-5n-2e, dry, TD 5,589 ft., no tops reported.

Globe Oil & Refining Co. 1 McDonald, SE SE NW 26-5n-1w, dry, TD 6,218 ft., sand 4,660-75 ft., 5,714-26 ft. and 5,888-5,901 ft., Mississippi lime 5,901 ft., Woodford 5,906 ft., Misener 6,152 ft.

McIntosh County: Public Service Co. 1 Brotton, NE SW NW 27-9n-14e, dry, TD 4,238 ft., Booch 1,715 ft., Base Gilcrease 3,315 ft., Wapanucka 4,228 ft.

Murray County: Kerr-McGee 1 Short, NW NW SE 19-1n-2e, dry, TD 2,567 ft., no tops reported.

Okfuskee County: Summitt Drilling Co. et al 1 Gafford Estate, SE SE NE 26-12n-7e, dry, TD 3,925 ft., sand 2,665-2,717 ft. and 2,768-2,860 ft., Upper Skinner 2,895 ft., Lower Skinner 2,900 ft., Booch 3,684-95 ft., Gilcrease 3,785 ft., sand 3,830-38 ft. with a small show of gas, Cromwell 3,888 ft., shale 3,905 ft., lime 3,910 ft.

Oklahoma County: R. C. Holt 1 Rinehart, SW NW NW 34-14n-1e, dry, TD 5,819 ft., Oswego 4,878 ft., Mayes 5,397 ft., Woodford 5,433 ft., Viola 5,617 ft., 1st Wilcox 5,718 ft., 2nd Wilcox 5,800 ft.

Payne County: John E. Hughes 1 Gray, SW SW NE 15-18n-3e, dry, TD 4,270 ft., Bartlesville 3,763 ft., Viola 4,159 ft., 1st Wilcox 4,229 ft., 2nd Wilcox 4,252 ft.

Pontotoc County: Carter Oil Co. 1 David Jenkins, NW NW SW 21-4n-4e, dry, TD 1,624 ft., sand 1,596-1,602 ft.

Pottawatomie County: O. E. Dempsey 1 Hatley, SW NW NW 3-9n-4e, dry, TD 4,380 ft., Wewoka 3,200 ft., Calvin 3,855-3,965 ft., no Earlsboro present, Mayes 4,350 ft., Woodford 4,404 ft., Hunton 4,522 ft., Viola 4,673 ft., dolomite 4,724 ft., Wilcox 4,790 ft.

Seminole County: Wrightsman Oil Co. 1 Leslie Rogers, SE SE NW 21-9n-8e, dry, TD 4,588 ft., Booch 3,266-90 ft., Caney 3,696 ft., Woodford 4,192 ft., Misener 4,250 ft., Viola 4,400 ft., Wilcox 4,484 ft.

Mid-Continent Petroleum Corp. 1 J. C. Okey, SE SW NE 22-9n-8e, dry, TD 3,540 ft., Upper Calvin 1,304 ft., Lower Calvin 1,640 ft., Booch 3,064 ft., Gilcrease 3,216 ft., Wapanucka 3,459 ft., Cromwell sand 3,517 ft.

Stephens County: Ryan & Hayes 1 Williamson, NW SE 23-3s-9w, dry, TD 2,652 ft., sand 1,148-70 ft., 1,325-40 ft. and 1,570-1,610 ft., lime 1,905-15 ft. and 2,376 ft., sand 2,612-38 ft.

R. B. Farris & John Rhodes 1 Bowles, SW SE SE 32-2s-8w, dry, TD 2,810 ft., no tops reported.

Nu-Enamel Operating 1-A Stephens, S/2 NE NE SW 11-1n-4w, dry, TD 615 ft., no tops reported.

Tillman County: Virgil Thompson 1 Johnson, NE SW 11-1s-16w, dry, TD 1,001 ft., no tops reported.

J. R. Meeker 1 Knaust, SE SE NW 30-3s-16w, dry, TD 3,251 ft., no tops reported.

S. D. Johnson 1 Tindle, NE SE NE NW 18-3s-14w, dry, TD 2,250 ft., no tops reported.

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CANADIAN FIELDS

Important New Field in Alberta Plains Indicated

CHATHAM.—Indicating the opening of an important new field in the central Alberta plains a short distance south of Edmonton, Imperial-Leduc 1, LSD 5, 22-50-6w4, blew into production while drilling out plug late on February 13. A column of oil was blown some distance into the air.

The well, bottoming in the Devonian limestone at 5,066 ft., halted drilling on February 4, after coring a few feet into the porous zone and encountering light brown crude under considerable pressure. A series of drill-stem tests was made, the final test showing a 4,100-ft. rise in 1 hour. Imperial officials have announced that the well has now been completed, but no initial gage has been released. (For further details concerning this discovery, see page 191).

Turner Valley.—In the Turner Valley north extension, Foothills Oil & Gas 25, LSD 6, 9-21-3w5, finished with Madison lime at 8,627-9,157 ft., has initial production of 597 bbl. daily. Foothills 11, LSD 11, 4-21-3w5, finished in 1942 at 7,422 ft., will be deepened to restore production. Royalite 86, LSD 12, 3-21-3w5, is deepening below 8,500 ft. after getting the Home sand marker at 8,185 ft. Production at this well would open several other locations for drilling.

Ram River.—Following a shut down due to unfavorable weather, redrilling of Ram River Oils 3, LSD 12, 1-37-11w5, in the Ram River-Clearwater field of the central foothills has resumed. Ram River 4, LSD 9, 36-34-10w4, bottoming in Devonian limestone at 1,460 ft., is preparing for a shot.

Foremost.—In the Foremost gas field, southern Alberta, McColl-Union 6-D, LSD 6, 25-4-10w4, is testing at 2,244 ft. McColl-Union 10-B, LSD 10, 22-7-9w4, is finishing below 2,260 ft. McColl-Union 10-D is starting in LSD 10, 9-4-9w4. In the same general field, Foremost-Province 13-17-5-11, LSD 8, 17-5-11w4, is below 2,995 ft.

Bosanquet.—In southwestern Ontario, Imperial Oil has started drilling in a new

area, in Bosanquet Township, in the northern end of Lambton County. The area is east of Kettle Point, on Lake Huron, where extensive shale outcrops have disclosed traces of oil.

OHIO, KENTUCKY

Huntington Gas Pool Extended Westward

COLUMBUS.—A ½-mile west extension to the Huntington pool was brought in by The Ohio Fuel on U. A. Leonard, Tract 7, Huntington Township, Lorain County. Good Clinton sand at 2,420-30 ft. was gaged at 3,720,000 cu. ft. natural. The completion is the third well to be drilled on the farm and like other wells in the pool, was tubed without shooting. The company will move a location northwest for another test.

Hanley and Bird missed the Clinton sand in the wildcat on Wm. Seabold, Lot 36, Russia Township, Lorain County, and will drill on down through the St. Peter, below the Trenton. The test is on a large block of leases in the northwest part of the township.

The Union Drilling Co. is moving in a rig to drill a wildcat on the Whitacre Co., Section 24, Brown Township, Carroll County. The test will be 6 miles east of the Sandyville field.

Pumping equipment has been installed over the Hartman well in Section 34, Blue Rock Township, Muskingum County, and it is making 100 bbl. per day. The oil has been classified as Zanesville Pennsylvania.

Seven locations were reported in Athens County, four in Stark, two each in Muskingum and Morgan counties, and five others were scattered. Sandyville had 8 completions out of 21.

EASTERN KENTUCKY

ASHLAND.—The J. A. Taylor property in Pike County came in for a completion with better than a 500,000-cu. ft. open flow during the past week.

Kentucky-West Virginia Gas Co. completed well No. 837 at total depth of 3,230 ft., with completion at 582,000 cu. ft. in shale after shot.

One dry hole was noted on the Kentuck-West Virginia Gas Co. No. 5,698 G. W. Daniels property in Martin County, at total depth of 2,533 ft.

New locations were marked on the propery of Matilda Clark, Pike; Wiley Tolliver, Knott; Wm. Hyden, Johnson; Albert Thacker, Magoffin; Grover Runyon, Pike; M. M. Collins, Magoffin; Robert Williams, Pike, and J. A. Taylor, Pike.

WESTERN KENTUCKY

OWENSBORO.—Pure Oil Co. and Stanolind Oil & Gas Co. 1 G. Hammons, 2-H-67, Clay County, located about 50 miles southeast of Lexington, is a rank wildcat of special interest. From 3 ft. of saturation in the Knox, the hole filled up 1,500 ft. with oil and showed some gas. No bailing test was made. Chattanooga was found at 1,300 ft., Devonian at 1,445 ft., Eden at 1,910 ft., Lexington at 2,240 ft., Tyrone at 2,488 ft., and Knox at 3,440 ft. The test is drilling ahead at 3,523 ft.

INDIANA

EVANSVILLE.—Development in the Princeton pool is the current center of interest. Producing wells are initially good for from 50 to 150 bbl. per day. The Cypress sand at approximately 1,810 ft., the Benoist sand at approximately 1,925 ft., and the McClosky lime at approximately

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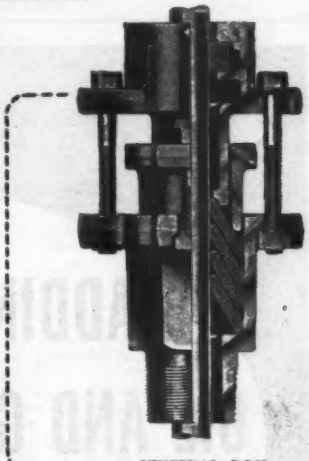

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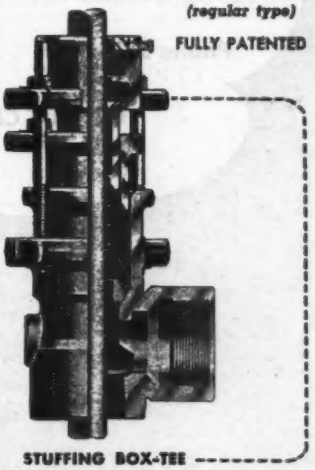

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2,050 ft. are all found productive in this area.

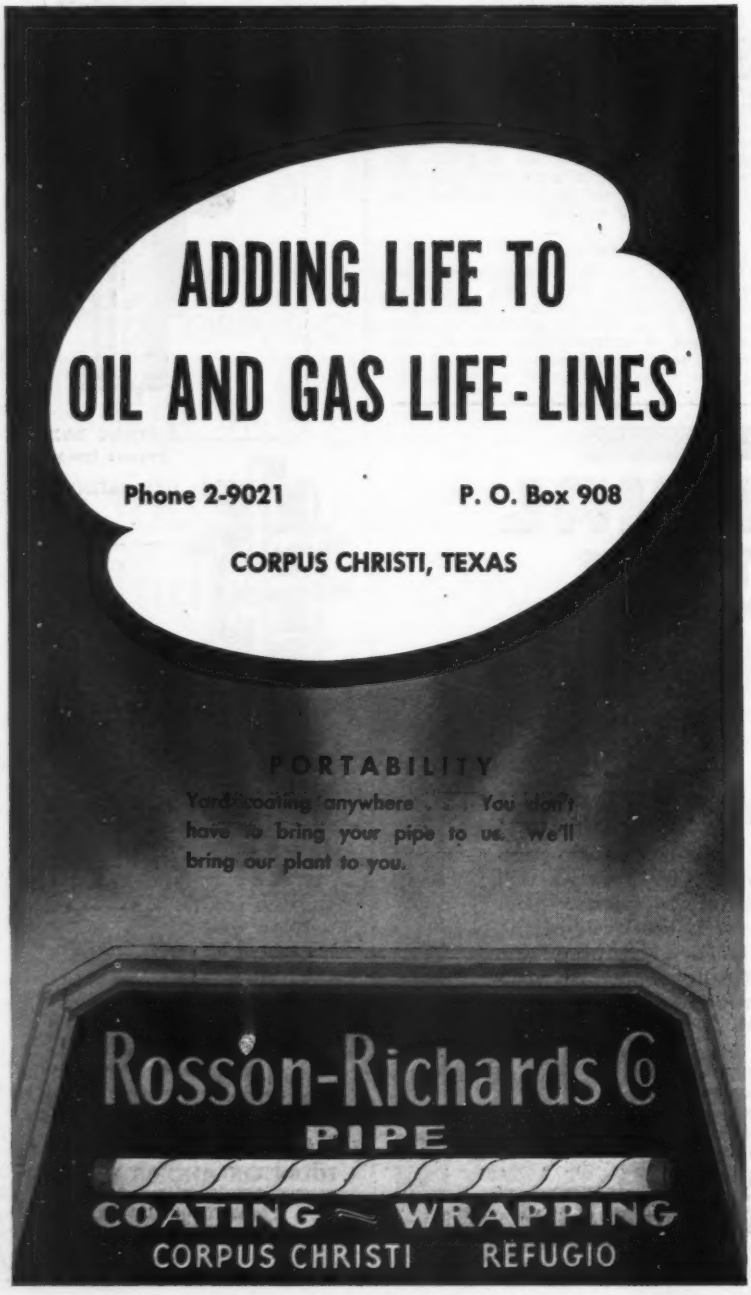
INDIANA WILDCAT FAILURE

Posey County: N. V. Duncan 1 Erwin Heirs, NW NE 7-8s-13w, elev. 356 ft., Menard 1,813-21 ft., Viola 1,912-17 ft., Golconda 2,125 ft., Barlow 2,262-69 ft., Ste. Genevieve 2,572 ft., TD 2,772 ft.

ROCKY MOUNTAIN

New Oil Pool Discovered In Southwestern Colorado

DENVER.—Colorado has a new oil pool on the Chromo structure in Archuleta County, southwestern part of the state, in L. E. Teague and Florence Drilling Co. 1 Fitzhugh, NW NE NE 4-32n-1e, 4 miles north of the New Mexico boundary, 12 miles southeast of Pagosa Springs, and 10 miles southwest of the Gramps field. It was completed at 470 ft., total depth, in the Greenhorn lime, of upper Cretaceous age, and pumped 210 bbl. first 18 hours. The oil is approximately 32.6° gravity, as compared with an average of 31.6° for Dakota sand production in the Gramps pool to the northeast. Oriental Refining Co. is taking the oil and began trucking it to its refinery at Alamosa on February 8. Shipments indicate that it is holding up better than 200 bbl. per day. The operators have around 6,000 acres on the structure and are preparing to drill additional wells. The casing was set in the discovery well at 460 ft. on top of the Greenhorn lime. This formation generally is from 10 to 20 ft. thick and lies approximately 150 ft. above the Dakota sandstone.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The Chromo structure is a well-defined dome which has been known for a number of years and has been prospected to a considerable extent with shallow wells, most of them showing sulfur water in the Dakota sands. Good closure has been worked out on three sides, but it appears to be open on the south. The well nearest to the discovery was on the Fitzhugh lease ½ mile to the northeast. It was spudded in 1929, and was drilled under adverse conditions. In August 1930 it had reached a depth of 320 ft. where it had a show for 5 to 10 bbl. of 38°-gravity oil in shale. A year later it was taken over by another operator, and upon cleaning out found the oil still showing after having stood under 500 ft. of water. It was deepened to 616 ft., and was reported to have a show for 50 bbl. of oil per day at 568 ft. Casing had been run to 504 ft., but was not cemented. A heavy snow storm prevented bringing in supplies and another string of casing for several weeks. By that time the oil had been drowned out. Subsequently, operations were suspended. Phillips Petroleum Co. drilled 3 miles to the southeast of the discovery in 1943 and abandoned the hole in quartzite at 1,625 ft. It had the Dakota at 240 ft., Morrison at 520, Chinle at 1,508 and quartzite at 1,515 ft. It had oil stains in the Dakota at 293-320 ft., and also at 520-535 ft., and at points between 1,170 and 1,146 ft. Other small shows were encountered at 1,255-30 ft. in the Todilto, and at 1,310-1,400 ft. in the Wingate, and hot fresh water at 1,558 ft.

Discovery on Herrick Dome.—Superior Oil Co. 1 Herrick, SW NW SE 1-16n-76w, Herrick Dome, Albany County, Wyoming, is unofficially reported showing for a discovery at an undisclosed depth. It spudded last fall as a test to the Sundance at 2,700 ft., on a 3,000-acre block. Last top reported was the Sundance at 2,390 ft. At 2,467 ft. a new contract was made with Loffland Brothers to carry it to the Tensleep. Last week it was reported drilling at 3,635 ft. Since then it has been a tight hole. However, reports that a drill-stem test at 3,628-78 ft. recovered 2,150 ft. of 23.6°-gravity oil are generally accepted as correct. Casing has been run, but officials have declined to disclose where it was set. The well is located 6 miles southeast of the Quealy Dome where California Co. recently made a discovery in the Tensleep in an old well drilled deeper. The interval between the top of the upper Sundance and the Tensleep in the Quealy well was 1,245 ft., which would indicate the Herrick well is in the top of the Tensleep.

La Plata County discovery.—T. C. Hudson-Coryell 1 Schmidt, C NW NE 36-34n-12w, Red Mesa District, La Plata County, southwestern Colorado filled up 1,000 ft. with 40°-gravity oil 2 ft. in sand at a total depth of 3,310 ft. Hole started caving and while cleaning out fluid level rose to 1,500 ft. Top of the sand, believed to be the Dakota, was at 3,308 ft. Previously a 5-ft. sand with a show of oil was topped at 3,295 ft., and casing was set. The plan of the operator is to run a liner from the bottom of the casing to the top of the second sand and test before drilling deeper. Another show was reported higher in the hole at 3,050 ft. in the top of the Niobrara. The 7-in. was cemented at 3,057 ft. Some doubt as to the identity of the formations has not yet been cleared up. Location of the well is 2 miles north and east of the nearest of nine wildcats drilled on a northeast-southwest trend in past years within a distance of 7 miles, on what some geologists have described as a monocline. Some of these wells had good shows in the Dakota and in sands above.

Hidden Dome discovery.—Ohio Oil Co. 2 OPC-2, NW SE SE 31-48n-90w, Hidden Dome, Washakie County, Wyoming, is reported unofficially to have cored good saturation in the Tensleep, top at 4,549 ft., and at last report was drilling ahead at 4,616 ft. Last official report of tests was at 4,245-4,300 ft. in the Embar with a recovery of 250 ft. of oil, 150 ft. of oil-cut mud, and 50 ft. of mud in the Embar after which it was made a tight hole. James Donoghue,

SUMMARY OF JANUARY COMPLETIONS

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	99	50	145	0	*49	0	99	0	0	0	158,448	130
Pennsylvania	245	126	378	23	†96	12	213	20	0	0	372,670	200
West Virginia	74	12	46	49	13	1	35	29	9	0	212,761	221
Ohio	108	25	573	47	36	9	30	68	1	0	321,177	208
Indiana	37	20	1,723	1	16	2	24	11	0	0	79,729	65
Kentucky	35	14	811	7	14	2	21	12	0	0	67,448	63
Illinois	146	87	8,787	0	59	7	44	95	0	0	366,796	209
Michigan	106	18	573	10	‡78	3	67	35	1	0	227,416	102
Kansas	235	110	25,758	45	80	0	19	215	1	0	752,554	299
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	13
Oklahoma	365	173	24,877	30	§162	15	124	178	44	4	1,148,173	523
Texas	835	551	123,241	53	231	56	170	334	258	17	3,754,723	859
North	190	129	14,888	2	59	21	64	72	33	0	593,753	192
West Central	71	28	4,077	2	41	3	32	31	5	0	202,193	58
West	220	185	81,403	3	32	13	29	93	78	7	1,081,212	103
Panhandle	48	14	1,019	31	3	0	3	45	0	0	148,946	104
Eastern	46	25	2,964	6	15	0	4	19	23	0	231,031	77
Gulf Coast	128	86	9,902	4	38	0	1	27	93	7	845,193	240
Southwest	132	84	8,988	5	43	19	37	47	26	3	652,395	85
Louisiana	116	72	11,515	3	41	2	16	29	40	29	823,457	194
Northern	44	27	2,944	1	16	2	12	20	9	1	162,413	69
Southern	72	45	8,571	2	25	0	4	9	31	28	661,044	125
Arkansas	21	13	1,580	1	7	0	0	9	12	0	117,610	44
Mississippi	38	22	9,042	1	15	0	1	6	16	15	313,624	65
Ala., Ga., Fla.	5	0	0	0	5	0	0	3	2	0	24,972	20
Montana	14	4	235	7	3	4	4	6	0	0	28,661	38
Wyoming	18	11	3,206	1	6	0	0	11	7	0	85,339	71
Colorado-Utah	13	11	2,813	0	2	0	0	2	11	0	75,407	66
New Mexico	51	37	10,007	3	11	3	3	20	24	1	238,835	116
California	181	146	24,821	5	30	0	66	68	44	3	607,550	254
Total January	2,742	1,502	250,131	286	954	116	936	1,151	470	69	9,777,350	3,760
Total December	2,388	1,248	211,434	244	896	82	924	934	394	54	8,039,689	3,840

Service wells: *49, †91, ‡13, §2.

president of Mackinnie Oil & Drilling Co., which has 8,000 acres surrounding the Ohio block, has called for bids for a test in SW SW SW 30-48n-90w, nearly a mile northwest of the Ohio test, on the opposite side of the axis, and in the area which has produced light oil from the Frontier. It is approximately 300 ft. down structure and will throw light on the prospective area of the producing horizons.

COLORADO SUCCESSFUL WILDCAT

Chromo, Archuleta County: Teague and Florence Drilling Co. 1 Fitzhugh, NW NE NE 4-32n-1e, TD 470 ft., pumped 250 bbl. per day 32.6°-gravity oil per day, top Greenhorn lime, where casing was set, 460 ft.

COLORADO WILDCAT FAILURE

Haystack Mountain, Boulder County: Dyer & Rice 1 Bruning, NE SW SW 28-2n-70w, TD 3,082 ft., dry and abd. Frontier 2,446 ft., Muddy 2,881 ft., Dakota 3,060 ft.

LEGAL

CALL FOR BIDS. To sell royalty crude oil accruing to the United States. Sealed proposals, in duplicate, will be received in the office of the Director of the Geological Survey, Room 5244 Federal Works Agency Building, Washington 25, D. C., on or before noon, March 4, 1947, for the sale of royalty crude oil accruing to the United States from Federal lands in the Aliso Canyon field, the Oak Canyon field, the Buena Vista Hills field (outside Naval Petroleum Reserve No. 2), the Jacalitos Hills field, and the Santiago field, all in California. No bid received after the time fixed for submitting bids will be considered. Contracts for the royalty oil will be for a term of 3 years beginning the first of the calendar month following execution by the Secretary of the Interior. The monthly royalty oil accruals now offered for sale amount to about 700 barrels from the Aliso Canyon field; 6,600 barrels from the Oak Canyon field; 4,900 barrels from the Buena Vista Hills field; 5,400 barrels from the Jefferson Hills field, about 9,200 from the Santiago field. Specifications on the quantities of crude oil offered for sale, the form of bids, the form of contract, and the conditions with respect to bond requirements, deliveries, volume measurements, gravity determinations, and other details relative to the call for bids may be obtained by bidders from the Director, Geological Survey, Department of the Interior, Washington 25, D. C., or the Oil and Gas Supervisor, U. S. Geological Survey, 533 U. S. Post Office and Courthouse Building, Los Angeles 12, California. Sealed bids must be submitted to the Director of the Geological Survey, Department of the Interior, Washington 25, D. C., pursuant to the specifications, the envelope to be marked plainly "Bid on California Royalty Oil, not to be opened before noon March 4, 1947." C. Girard Davidson, Assistant Secretary of the Interior.

NPC Statistical-Advisory Committee Appointed

WASHINGTON. — The statistical-advisory committee of the National Petroleum Council will be headed by Dr. Joseph E. Pogue, Chase National Bank, New York, as chairman, Walter S. Hallanan, council chairman, has announced.

Hallanan said the next meeting of the council will be held in Washington April 22. Earlier, he announced the membership of the temporary committee to study aircraft-fuel production capacity as authorized by NPC in response to a request of the Oil and Gas Division.

Other members of the statistical-advisory committee are: Oliver S. Ambrose, Tide Water Associated Oil Co.; Merle Becker, M. C. McBride, Inc., St. Louis; John Boatwright, Standard Oil Co. (Ind.); James V. Brown, Independent Petroleum Association of America; Walter E. Caine, American Gas Association; Stewart P. Coleman, Standard Oil Co. (N. J.); D. V. Cotter, Magnolia Petroleum Co.; John W. Day, Western Petroleum Refiners Association; E. DeGolyer, DeGolyer & MacNaughton; Gordon Duke, National Council of Independent Petroleum Associations; Dr. Richard J. Gonzales, Humble Oil & Refining Co.; R. A. Hunter, Gulf Oil Co.; Dr. F. A. Lahee, Sun Oil Co.; William F. Lowe, Natural Gasoline Association of America; E. Madison, The Texas Co.; Edward P. Potter, Amerada Oil Co.; E. E. Pyles, Los Angeles; J. H. Salmon, Shell Oil Co., Inc.; Fred Van Covern, American Petroleum Institute; John G. Walling, Honolulu Oil Corp.

Members of the aircraft-fuel production committee are: chairman, Bruce K. Brown, Standard Oil Co. (Ind.); R. C. Alend, Phillips Petroleum Co.; Paul G. Blazer, Ashland Oil & Refining Co.; Reid Brazell, Leonard Refineries, Inc.; George Davidson, Standard Oil Co. of California; C. E. Davis, Shell Oil Co., Inc.; A. P. Frame, Petroleum Advisers, Inc.; W. M. Holaday, Socony-Vacuum Oil Co.; Arthur E. Pew, Sun Oil Co.; G. H. Taber, Sinclair Refining Co.; H. D. Wilde, Humble Oil & Refining Co., and J. A. Worden, The Texas Co.

Intava Testing New Plane-Servicing Unit

A new-type airplane-fueling unit which features a method of drawing directly from bulk tanks and fills wing tanks at twice the speed of present tank trucks is now in experimental use at La Guardia field, New York.

A mobile pumping unit carrying 100-ft. hoses, the new unit draws fuel from an underground pipe-line system. An elevator platform raises the fueling crew, eliminating the necessity for workmen to climb on the wings of fueling planes. The new unit was developed by Intava, Inc., engineers.

Account Changes Approved

WASHINGTON.—The Federal Power Commission has approved proposed accounting adjustments by Cities Service Gas Co. eliminating from its gas-plant accounts $16,766,336 representing excess over original cost of its gas plant.

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For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

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Distributors
Allied Supply Co. Clarke-Wall, Inc.
Bethlehem Supply Co.
(Mid-Continent and California)
Hickey Pipe & Supply Co.

Among the
Drilling Contractors

Wheless Drilling Co., Shreveport, has started operations at Arkansas-Louisiana Gas Co.'s wildcat test in the eastern part of the M. C. McCauley tract, in the southwestern part of the P. Daugherty Survey, in Harrison County, Texas. Location is 3 miles east of Scottsville. Projected depth of around 6,800 ft. is expected to put it some 500 ft. into the Travis Peak formation. Southern Production Co., also holding surrounding acreage, is supporting the test, it was said.

Bill Taylor Drilling Co. has contract for Cockburn Oil Corp. 1 Wharton Bank & Trust Co., a 6,000-ft. test in the southeastern part of Wharton County, Gulf Coast Texas. Location is 3 miles south of Lane City and 3½ miles east of Lane City oil production.

M. J. Delaney has contracted to drill the first of four wildcat tests planned by J. C. Benedum in the area north of San Augustine, in San Augustine County, East Texas. The first well is to be the M. E. Davis 1 W. A. Johnson, on a 100-acre tract in the Edmund Quirk Survey, 1 mile west of Blandlake. Scheduled depth is around 9,000 ft. Nearest major production is about 25 miles to the east in Zwolle field in Sabine Parish, Louisiana. Benedum was said to be planning additional exploration in Sabine County, Texas, when the present progran. is finished.

Delta Drilling Co. has been awarded drilling contract on the Mountain States Petroleum Co. 1 Kinney, in C NE SE 33-2n-101w, 3 miles east of the nearest producer in the Rangely field, Colorado, and 1½ miles outside potential area as mapped by the U. S. Geological survey. The well has spudded.

Can-Tex Drilling Co., Calgary, Alta., has the contract for Taber-Province 63-15A, to be drilled for California Standard, in LSD 6, 15-9-17w4, in the West Taber field, southern Alberta, Canada.

Wakefield tools will be used to drill the Earl Wakefield & Flynn 1 Frantz, in NE NE SE 8-31-3w, 1½ miles south of Conway Springs in the northwestern part of Sumner County, Kansas. Nearest production is in the Latta pool, 10 miles to the northwest.

B. & R. Drilling Co. has contract to drill the Sam K. Pack 1 Roy, in SW SW NE 14-8-20w, Rooks County, Kansas. Location has been staked 6½

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Mud Products, Inc., is an organization designed to provide maximum drilling mud distribution to the drilling industry. It maintains its own trucks so that twenty-four hour service is available.

Mud Products, Inc., is in position to establish regular mud stock checks at the drilling location. This prevents maintaining large stocks at the well.

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Mud Products, Inc.
Drilling Muds and Chemicals
PHILTOWER BLDG., TULSA 3, OKLA.

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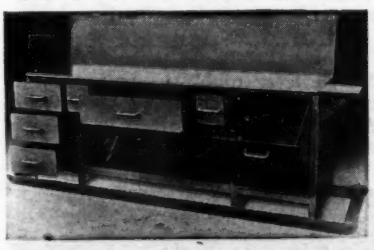
Falls City, Neb.	807
Stockton, Kan.	335
Great Bend, Kan.	1555
Liberal, Kan.	1386-L
Shawnee, Okla.	586
Duncan, Okla.	2225
Tulsa, Okla.	3-6143
Hobbs, N. M.	275-R

OWEN

TYPE "A" WORK BENCHES



REDUCE DRILLING EXPENSES

These all-steel, all-welded benches provide a convenient place for all hand tools on the rig. They save drilling dollars by reducing loss and damage of tools and by saving time ordinarily spent in looking for misplaced tools.

Six big drawers and a rag bin provide storage space for all the tools on your rig. Drawers are weatherproof and mounted on rollers for easy operation.

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HOUSTON TEXAS

miles northwest of the Webster pool. Test is on core-drill information and is being supported by Continental Co., Amerada Petroleum Corp., and Skelly Oil Co.

Calvert & Willis, Inc., drilling contractors, Olney, Ill., are on the following contracts: Sells Petroleum, Inc., 4 Elliott, Mink Island pool, Posey County, Indiana; J. J. Lynn 1 Mitchell, Hamilton County, Illinois, and Inland Producers, Calvert & Willis 3 Biggerstaff, Hamilton County, Illinois.

Neeld & Hood Drilling Co. has contract on the Akin & Dimock 2 E. Shaw, in C E½ NW NE 28-3s-11w, southeast of the Essaquanahdale field, in Cotton County, Oklahoma. Contract is for 1,600 ft.

Aggas Drilling Co. is contractor on the W. A. Delaney, Jr., and Sunray Oil Co. 1 Haning, in NW SE SW 11-9n-7e, in the West Bethel area of Seminole County, Oklahoma.

Boyd Troup is contractor on the Rex E. Lindley 1 Davis-Patterson, in SE SE SW 30-7n-8e, in the Fish pool, Seminole County, Oklahoma. Well was drilling at 485 ft.

Mohawk Drilling Co. has taken on a deal for a Wilcox sand or 4,200-ft. wildcat test at the No. 1 well in SW SW NE 20-22n-3e, south of the Watchorn field in Pawnee County, Oklahoma. Tools were to be moved in immediately.

Double-R Drilling Co. and Sunray Oil Corp. are trying for a southeast extension of the Northeast Arcadia field of Oklahoma County, Oklahoma, at the 1 Henderson, in SW SW SW 24-14n-1w, where surface pipe has been set.

Thompson - Carr, Inc., has been awarded drilling contract on the Texas Co. 1 J. H. Samuels, in northwest Yoakum County, Texas. It is 660 ft. from north and 1,980 ft. from west lines of Section 242, Block D, John H. Gibson Survey. Drilling to 5,500 ft., or pay in the San Andres, was to start immediately. Rotary material was being moved in.

E. M. Shields has been awarded drilling contract on the Socony-Vacuum Oil Co., Inc., 1 N. Briggs, in NW NW SE 25-9n-11w, Kent County, Michigan.

Acme Drilling Co. is contractor on the James E. Duffy, Jr., 1 Robert E. McClellan, in NW NW NW 25-6n-11e, Lapeer County, Michigan.

Grayhill Drilling Co. is contractor on Dale Rorem 1 Fee, in C SE SW 32-2n-1w, Garvin County, Oklahoma. Rotary was being rigged up for the test.

The Multi-range *lightweight* BJ Type "T" Tong for Drilling or Production Rigs

Designed to lighten and speed up the job of running tubing, BJ type "T" tongs are equally valuable in "nippling up" or as lay tongs. Made in five series: A, B, C, D, and E, with available jaws in each series to handle API tubing and coupling sizes from 1" to 4", plain or upset.

Change in size of tong jaws can be made quickly and easily. The dies are self sharpening and provide a quick, positive, non-crushing grip. The handle is made of reinforced seamless tubing, and is designed to provide sturdy, balanced construction. Stabbed on, these tongs cannot come open even if hinge pin fails, yet jaws easily release by pulling back on the sleeve. Call your BJ supplier and let him equip your rigs with "T" tongs.

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PERSONALS

M'Connell Identified With Persian Gulf Oil Since 1938

PHILIP C. McCONNELL returned last month to Saudi Arabia to resume his duties as manager of production for Arabian American Oil Co. after spending several weeks in the United States visiting friends. He has been associated with American oil activities in the Persian Gulf area since 1938. He was first connected with the Bahrein Petroleum Co., Ltd., and became chief engineer of its field operations on Bahrein Island.

After oil was discovered in Saudi Arabia by the Arabian American company (Standard of California and The Texas Co.) McConnell joined that organization and is now in charge of field operations producing more than 200,000 bbl. daily with plans for further expansion under way. The McConnells now rate as "pioneers" in the American oil colony of the Persian Gulf.

McConnell served as first lieutenant in the artillery in World War I. He received the degree of bachelor of science in petroleum engineering from the University of California in 1922. He joined the Standard of California organization and previous to his transfer to Bahrein Island served the company in various capacities in connection with its field operations over a period of 15 years.

C. E. Tabor, superintendent of drilling and production in Texas for C. L. McMahon, Inc., Tulsa oil-producing company, last week was named general manager. **Mrs. C. L. McMahon, Sr.,** was elected president; **Charles L. McMahon, Jr.,** secretary, was named vice president; and **E. R. Statham** was named assistant secretary. The reorganization was necessitated by the recent deaths of **C. L. McMahon, Sr.,** president and general manager, and **W. Basil McEvoy,** vice president and treasurer. Charles L. McMahon, Jr., and Tabor are interested together with B. G. Byars in Power Drilling Co., recently organized and now operating three rigs in East Texas.

Joe R. Merideth, engineer with Texhoma Natural Gas Co., has retired after 15½ years service with the company.

John R. Davis, geologist for Superior Oil Co. at Wichita Falls, Tex., will leave this month for Bogota, Colombia, to do geological work in South American fields.

B. R. Nunn has joined the laboratory staff of Skelly Oil Co. and has been assigned to the gas-analysis section.

George C. Getgood, in charge of the Denver office of the crude-oil-purchasing department of Standard Oil Co. (Ind.), has been transferred to Tulsa. The Denver office is being closed.

F. V. J. McCoy has been reassigned as supervisor of the personnel-training program of Shell Oil Co., Inc., in the Houston area following 2 years' service in the company's New York division.

William J. Hilseweck, district geologist in Midland for Gulf Oil Corp., has been elected president of the West Texas Geological Society. Other new officers are **William A. Waldschmidt,** Argo Oil Corp., vice president, and **Charles F. Henderson,** Stanolind Oil & Gas Co., secretary-treasurer.

Howard L. Malakoff has been elected chairman of the Oklahoma Chemical Engineering Society for 1947. Other new officers are **Virgil Scarth,** vice chairman; **Fred H. Poettmann,** secretary-treasurer; and **H. R. Legatski,** who is the retiring chairman, and **Lawrence K. Cecil** and **Harrison L. Hays,** members of the executive committee.

Mastin Nixon, Corpus Christi, has been elected to the board of directors of three subsidiaries of Southern Alkali Corp. In addition to serving as vice president, Nixon also will be a member of the directorate of the Southern Pipe Line Corp., Southern Minerals Corp., and Southern Petroleum Corp.

Dean A. McGee, executive vice president of Kerr-McGee Oil Industries, Inc., has been elected chairman of the oil and gas division of the Oklahoma City Chamber of Commerce.

James O'Neil has retired, effective March 1, as night superintendent of the Bayonne refinery of Tide Water Associated Oil Co. after 38 years of service.

R. A. Bruce, London, Burmah Oil Co., Ltd., and R. G. Roberts, London representative of Hughes Tool Co., now in the United States, were among the guests last week at a meeting of the Houston Nomads

H. D. Kolb, assistant manager of Standard Oil Co. of New Jersey's Esso Training Center at Elizabeth, N. J., is shown here receiving a Legion of Merit citation by the War Department. Col. W. G. Bowyer, U. S. Army Air Forces, is pinnning on the medal. In the background are Frank W. Abrams, board chairman of Standard Oil Co. (N. J.) and M. J. Rathbone, president of the operating company. Kolb received the citation for the application of "ingenuity and comprehensive knowledge of management principles" while serving as a lieutenant colonel in the Army Air Forces. He directed the wartime training of more than 300,000 Army civilian employes at Wright field and at Orlando, Fla.

L. A. Ogden, division engineer of the Illinois basin for Pure Oil Co., has been transferred to Tulsa as division engineer. He succeeds **W. M. Saxon,** who will be given another assignment.

H. C. Anderson has been transferred by Continental Oil Co. to become resident chemist at Glenrock, Wyo., succeeding **L. S. Burke,** who has been promoted to assistant superintendent of the Glenrock refinery.

H. C. Petersen, Freeport Sulphur Co., has been elected secretary-treasurer of the Delta Section of the American Institute of Mining and Metallurgical Engineers to succeed **W. J. Gillingham,** Schlumberger Well Surveying Corp., who is being transferred to Caracas, Venezuela. Other officers of the recently-organized section are: **Dan L. Marshall,** The Texas Co., chairman; **B. O. Craft,** Louisiana State University, and **J. C. Posgate,** Humble Oil & Refining Co., vice chairmen; and **Earl Kipp,** The California Co., and **J. W. Foley,** The Texas Co., directors.

Dr. Max Neuhaus, formerly director of research of Jefferson Chemical Co., Inc., has been named manager of Jefferson's technical and research department, with **Dr. Paul P. McClellan** and **John C. Paul** as assistant managers, the company has announced. **Peter Harrison,** of Jefferson's engineering department, has been named purchasing agent, and **G. R. Wick** has been named assistant chief engineer. Jefferson Chemical, formed in November 1944 by American Cyanamid Co. and The Texas Co., is building a petrochemical plant at Port Neches, Tex., which is scheduled to begin production during the latter half of this year.

D. D. Cochrane, chief engineer of Godfrey L. Cabot, Inc., has received a citation from the War Department for his contribution to the war effort in the development of a substitute for Shawinigan carbon black for use in Signal Corps dry cells.

R. A. Findley has been placed in charge of the chemical-engineering pilot plant of Phillips Petroleum Co. in Bartlesville, Okla.

Dr. Clarence C. Nielson has been transferred from the Baltimore refinery of Continental Oil Co. to Ponca City.

L. Earl Hoffman has joined Phillips Petroleum Co. as a chemist in the special-products division of the company's chemical-products department.

Newly elected directors of the National Foreign Trade Council who have oil company connections are: **M. W. Bowen,** foreign-trade executive of Socony-Vacuum Oil Co., Inc.; **W. J. B. Dixon,** assistant treasurer in New York of The Texas Co. and former acting manager of Texas Co. (Caribbean) Ltd., and **H. L. Schultz,** vice president and director of Standard-Vacuum Oil Co. Other N.F.T.C. directors include **E. F. Johnson,** general counsel, Standard Oil Co. (N. J.) and **A. E. Thayer,** secretary of California Texas Oil Co., Ltd.

CALENDAR

February

American Petroleum Institute, public-relations operating committee, meeting, Chicago, February 25-26.

March

American Society of Mechanical Engineers, spring meeting, Mayo Hotel, Tulsa, March 2-5.

Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill., March 13.

American Institute of Mining and Metallurgical Engineers, annual meeting, and World Conference on Mineral Resources, Waldorf Astoria Hotel, March 17-19.

American Society of Lubrication Engineers, second annual convention, March 17-19, William Penn Hotel, Pittsburgh.

Southern California Meter Association, Rio Hondo Country Club, Downey, March 20.

Oklahoma Utilities Association, annual convention, March 20-21, Tulsa Hotel, Tulsa.

Western Metal Congress and Exposition, Oakland, Calif., March 22-27, 1947.

Western Petroleum Refiners Association, annual membership meeting, San Antonio, March 24-26.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint meeting, Biltmore Hotel, Los Angeles, March 24-27.

Oil Heat Institute of America, annual convention, Traymore Hotel, Atlantic City, N. J., March 24-30.

Division of Production, American Petroleum Institute, Southwestern District spring meeting, Blackstone Hotel, Fort Worth, March 27-28.

April

National Association of Corrosion Engineers, annual convention, Palmer House, Chicago, April 7-10, 1947.

Board of directors, Rocky Mountain Oil and Gas Association, Northern Hotel, Billings, Mont., April 10-11.

Southern Gas Association, Biloxi, Miss., April 17-18.

Division of Production, American Petroleum Institute, Eastern District spring meeting, Pittsburgh, April 16-18.

National Petroleum Association, meeting, Cleveland, April 17-18.

Natural Gasoline Association of America, annual meeting, Baker Hotel, Dallas, April 23-25.

Interstate Oil Compact Commission, spring quarterly meeting, Birmingham, Ala., April 24-27.

Natural Gas Department, American Gas Association, spring meeting, Stevens Hotel, Chicago, April 30-May 2.

May

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, May 6-8.

Independent Petroleum Association of America, midyear meeting of directors, Jackson, Miss., May 8-9.

South American Oil Congress, Lima, Peru, May 12-17.

Division of Production, American Petroleum Institute, Pacific Coast District spring meeting, Los Angeles, May 15-16.

Indiana Gas Association, Springs Hotel, French Lick, May 15-16.

National Oil Scouts and Landmen's Association, annual convention, Roosevelt Hotel, New Orleans, May 15-17.

Southern California Meter Association, Rio Hondo Country Club, Downey, May 15-22.

Pennsylvania Gas Association, Wernersville, Pa., May 20-22.

Oil and Gas Power Division, American Society of Mechanical Engineers, nineteenth national conference, Cleveland, Ohio, May 21-24.

Division of Production, American Petroleum Institute, Mid-Continent District spring meeting, Amarillo, Tex., May 22-23.

Equipment Men in the News

The Continental Supply Co. conducted a two-day sales meeting of Oklahoma-Kansas district key personnel on February 3 and 4 at the Mayo Hotel, Tulsa. With Ross A. Brewer, district manager, in charge, the 42 district men were addressed by F. I. Brinegar, executive vice president, J. A. Mussler, manager of tubular sales, and J. A. Davis, manager pipe-line equipment division, all of Dallas

Lubri-Gas Expands

Chas. E. Paden, of Lubri-Gas Laboratories, has announced that he has turned over to Lubri-Gas Corp., with general offices at 6230 Second Avenue, Detroit, all United States sales and distribution of the product effective February 1. Lubri-Gas, which treats gasoline and diesel motor fuels, is now being distributed in the United States, Canada, England, and South America.

Officers of Lubri-Gas Corp. are Robert N. Green, president; L. N. Lyle, vice president; Hubert Quinn, secretary; and Ray Lawler, treasurer. G. D. Anstine, who has been sales manager for Lubri-Gas Laboratories for the past 3 years and prior to that was with W. H. Barber Co. and Universal Oil Products Co., is general sales manager for the new corporation.

Brown in Tulsa

Noel Brown, general manager, Flint Industries, with headquarters at El Tigre in eastern Venezuela, is in Tulsa on a 2-week trip during which he is buying equipment for contracting operations for rig building, tank building, pipe-line laying, installation of pumping units, and general oil-field construction for various major companies operating from Delta Amacuro to the Colombian border area. During the time that Brown is in the United States Charles W. Flint, president of the organization, is in Venezuela directing the affairs of the organization.

New Los Angeles Office For Babcock & Wilcox

Babcock & Wilcox Tube Co. announces that its Los Angeles office has moved from its headquarters in the Banks Huntley Building on South Spring Street to Petroleum Building, 714 West Olympic Boulevard, Los Angeles.

Curtin and Shartle Named Directors

W. H. Curtin, president of W. H. Curtin & Co., Houston, laboratory-supply firm, and Thomas H. Shartle, president of Texas Electric Steel Casting Co., Houston, were recently elected to the board of directors of the Houston Chamber of Commerce.

King Chicago Manager

R. H. Morse, Jr., vice president and general sales manager of Fairbanks, Morse & Co., Chicago, has announced the appointment of John S. King as manager of the Chicago branch house of the company, succeeding Frank V. Roy who retires from that position on March 1, 1947.

Seven Elevated in Republic National

Four assistant cashiers were elevated to rank of assistant vice president, and three new assistant cashiers were elected by the board of directors of Republic National Bank of Dallas, Fred F. Florence, president, recently announced. Promoted to assistant vice presidents were James S. Cook, J. W. Denny, H. Vinson Grice, and E. E. Wallace, Jr. New assistant cashiers are J. Willis Gunn, James E. Massey, and John W. Stovall.

Emsco Promotes Duncan

H. H. Glen, president of Emsco Derrick & Equipment Co., Los Angeles, has recently announced appointment of Dan Duncan to position of executive engineer, in which capacity he will act as coordinator of the various engineering activities of the company. Duncan's previous capacity was field engineer.

Bechtel Brothers McCone Changes Name

S. D. BECHTEL

Effective January 1 the name of Bechtel Brothers McCone Co. was changed to Bechtel Corp. At the same time, three subsidiaries became respectively Bechtel International Corp., Compania Bechtel, S.A., and International Bechtel, Inc. Principal officers are: S. D. Bechtel, president; W. E. Waste, Van W. Rosendahl, J. Perry Yates, V. G. Hindmarsh, Jerome K. Doolan, and C. Stribling Snodgress, vice presidents. Headquarters and major engineering offices are located in San Francisco.

Fox Chemicals Reopens

Fox Chemicals, Bristow, Okla., producers of chemically controlled paraffin solvents, has reopened under the management of F. Harold Bronaugh, it is announced by G. E. Fox. Bronaugh was formerly with Bethlehem Steel Corp.

Franklin in South America

Robert K. Franklin, owner, Rolo Manufacturing Co., Houston, left February 19 for a 6-week visit to South America. Most of his time will be spent in Venezuela and Colombia.

Speakers' table, seventh annual banquet Tulsa chapter Nomads, January 31, Tulsa Club. From left: Shep Miers, Southwest Supply Co., secretary-treasurer, national board of regents, regent-elect 1947, Tulsa Chapter; J. H. Eustice, W. C. Norris Mfr., Inc., chairman banquet committee; Henry A. Bourne, Republic Steel Corp., president, Tulsa chapter 1946, and regent-elect; Dr. Gustav Egloff, Universal Oil Products, Chicago, the speaker; Stanley W. Wilcox, Seismograph Service Corp., president Tulsa chapter, 1947; Russel F. Hunt, Hunt & Bradford, vice president, 1946; M. D. Gilbert, Rockwell Manufacturing Co., treasurer, 1946; H. M. Cosgrove, Mid-Continent purchaser, executive secretary, national board of regents

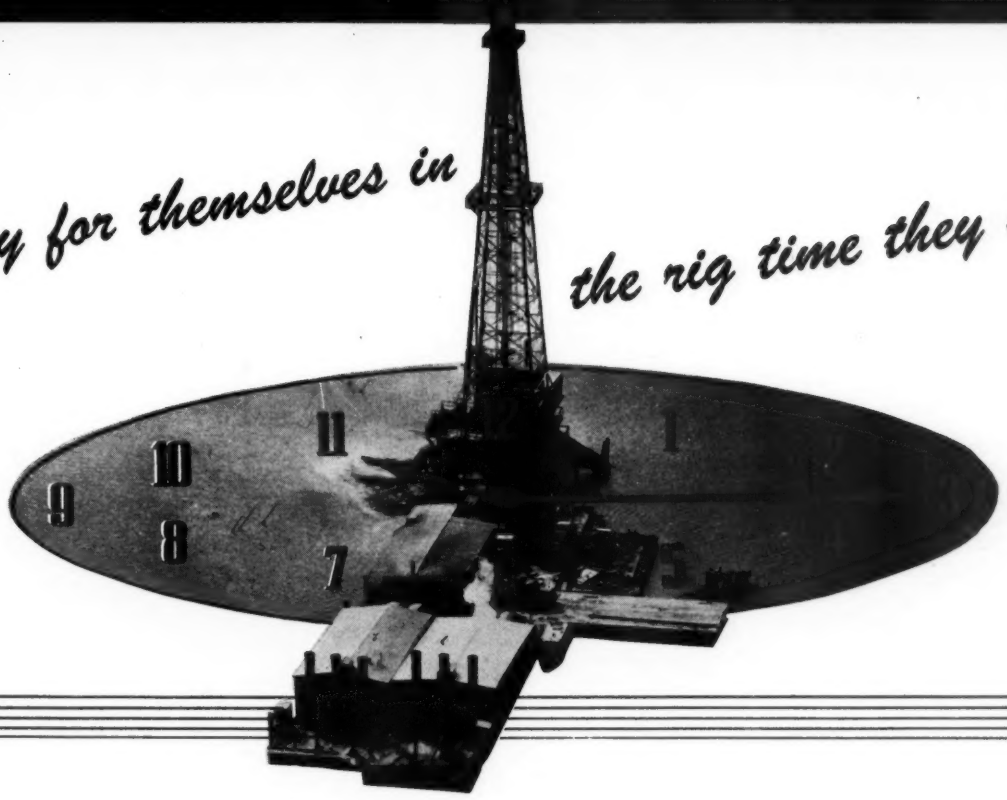
CAMERON

(Type "QRC")

Quick Ram Change

BLOWOUT PREVENTERS

Pay for themselves in the rig time they save!



Aside from the superior mechanical features of Cameron Type "QRC" Blowout Preventers which alone would justify their use because of their greater safety and all round utility, these new control units will actually pay for themselves on a few wells thru reduced ram change time. Whereas the large sizes of other models require up to 10 hours, or more, for changing rams, this operation with the "QRC" model requires only a few minutes. With from 3 to 5 ram changes required in drilling the average Gulf Coast well, for example, the saving in rig time is substantial. For this reason, one of the world's largest owners of drilling rigs is presently replacing all of his blowout preventers with Cameron Type "QRC".

Other "QRC" features include: High ratio of closing pressure to well pressure—8 to 1 as compared with 3 to 1 on earlier models; compact design—lower overall height, less weight, easier to install and transport; 6000 and 10,000 lbs. test pressure models in 6", 8" and 10" sizes; patented self-feeding ram packers; fluid pressure operation and other time-tested features which, for many years, have established Cameron as the standard of comparison in the pressure control field.

CAMERON IRON WORKS, INC.

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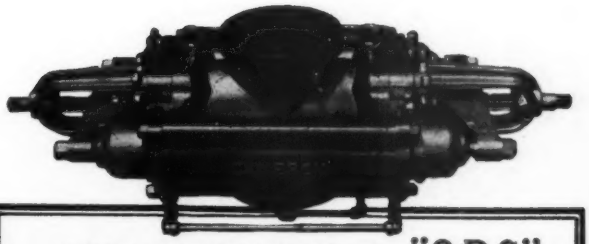

QUICK FACTS ABOUT "QRC"

- Quick Ram Change—Whereas many hours of hard labor were required for this operation on earlier models, rams can now be changed in a matter of minutes.
- High Closing Ratio — 1000 lbs. closing pressure will close the rams against approximately 8000 lbs. well pressure!
- Well Pressure Equalized Front and Back of Rams—Well pressure is bypassed to rear of rams where it aids in closing, thus contributing to the more favorable high closing ratio.
- Weighs 30% Less Than "SDA" Models — Compact design facilitates transporting the unit as well as its assembly in the field.
- 10,000 lbs. Test pressure Models—6", 8" and 10" sizes available in both 6000 and 10,000 lbs. test.
- Plus — Patented self-feeding ram packing, fluid pressure operation by remote control, self-centering rams and other time-tested mechanical features.

Hughes' "Engineered Solution" to the countless and ever-changing problems of the drilling industry has for over thirty-five years been accepted as the "standard of the industry" in any and every formation yet encountered the world over!

Hughes W-7R tricone rock bit is another outstanding example of the "Engineered Solution" formula. W-7R rock bit offers maximum penetration of the hardest formations encountered in rotary drilling, such as Chat, Chert, Pyrite, Quartzite and Dolomitic Sand Rock.

Hughes **TOOL COMPANY** HOUSTON, TEXAS

Standard of the Industry